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PHOTOGRAPHIC INFORMATION

## MODERN LENSES

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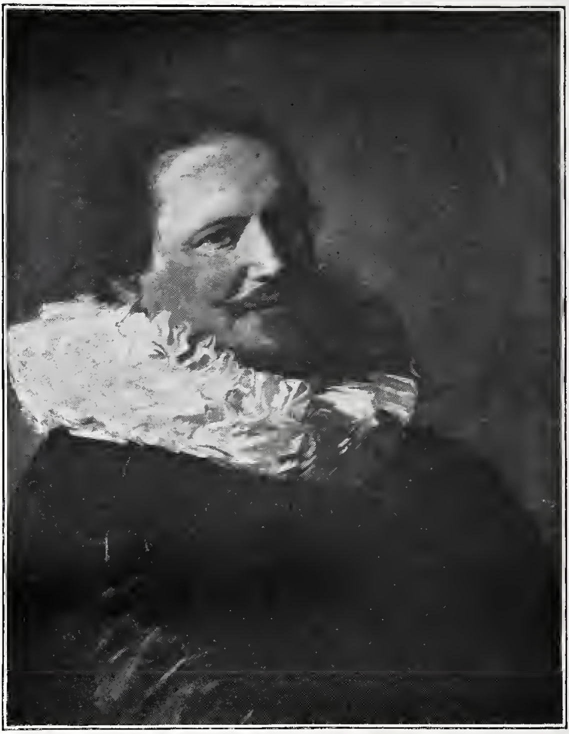

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PORTRAIT OF A MAN: BY FRANZ HALS
(Original in the National Gallery, London)

# THE PHOTO-MINIATURE

*A Magazine of Photographic Information*

Edited by John A. Tennant

Vol. I APRIL, 1899 No. 1

## MODERN LENSES.

The first step in photography as a hobby is generally the buying of an inexpensive camera. Such cameras usually have a lens fixed in the front of the box, and hence, at first, the lens is thought of simply as a part of the camera. As soon as the novice has learned how to expose and develop a plate, thus securing his first negative, he asks the two-fold question: What forms the picture-image, and how does it reach the plate? The simplest answer is light and the lens; and so, at once, the lens takes its proper place as the most important part of the photographic equipment, the camera-box being seen to be merely a dark chamber accessory to the lens, and enabling it to do its work on the sensitive plate. It is not correct, however, to imply that the lens is absolutely essential to the production of the picture-image, for good photographs may be made without a lens. Hence the question: Why do we use a lens?

Again, the novice attempts to photograph a street view and finds, on developing the negative, that the lines of the buildings are curiously distorted, or curved, in his negative. He seeks the cause of this defect, and is told that his lens is not rectilinear — *i.e.*, not capable of rendering straight lines as such. So he learns that his lens has limitations, and that there are different lenses for different purposes. This brings out the question: How shall I choose the lens best suited for the work I desire to do? At this point the novice probably talks with his dealer or reads the catalogues of lens manufacturers, and learns that the modern lenses known under the generic name of "Anastigmats" are emphatically superior to all other varieties for all purposes. From this point his bewilderment grows until the whole question of the lens assumes the proportions of a mystery, the advice of a friendly dealer being relied on in emergencies as the easiest solution of the difficulty.

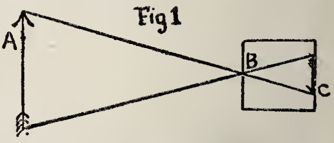
My purpose in this paper is to clear away the mystery surrounding the lens in the mind of the amateur photographer, and to set down as plainly and as briefly as may be all the information he needs to enable him to choose and use his lenses intelligently for the work in hand, together with some account of the advantages possessed by the modern "Anastigmats" over the lenses of a few years ago.

**What is a Lens?**

Let us first have a definition of a lens. "The photographic lens is an optical instrument constructed to form real images of objects that are situated in front of it, and to project these images upon a plane surface, such as the photographic plate or film" (Dallmeyer). In order to clearly understand this definition and the action of a lens, we must see the lens at work. We have seen that the camera is really a dark chamber accessory to the lens. A darkened room, with a window facing south, will therefore serve as a large camera, wherein we may move about and see what happens inside the camera proper when we photograph. Having such a room, we place a sheet of white card on an easel opposite the window. This represents the sensitive plate in position in the camera proper. We now completely darken the window with an opaque blind. If we make a hole in the blind, using a stout needle for the purpose, a beam of light enters our large camera and gives us upon the white card an image in natural colors of the objects outside which are opposite the aperture in the blind. We can now begin to note a few things which will help us to understand light, optics, and the lens.

**Inversion of Images.**

First we notice that the picture-image is upside down (inverted). Why? Because light travels in straight lines as long as the medium through which it passes remains unchanged. The inversion of the image is made plain in Fig. 1, in which A represents any object (such as a tree, building, etc.) external to the camera and in front of the pinhole. Rays of light proceed from



A in every direction in straight lines, and some of them pass through B, continuing in straight lines until interrupted by the white card, where they form an inverted image C. A moment's thought, with the diagram, will make this clear. In it we also have an explanation of the inversion of the picture-image on the ground-glass of our camera proper.

**Pinhole Images.** We also notice that the image on the card is not as sharply defined as might be, and that it lacks brightness or illumination to such a degree that it would require a very long time of exposure to get a photograph of it with a sensitive plate. Our knowledge of the outdoor scene represented on the card also informs us that objects which are considerably separated from each other at varying distances from the camera are all equally defined upon the card, by which we learn that the pinhole gives a picture-image with great depth of definition—*i.e.*, it brings objects situated at different distances to a focus on one plane so that they are all equally sharp on the card.

Seeking to make the picture-image sharper in definition, we move the card nearer to and farther away from the aperture. As we move it toward the pinhole the size of the image decreases; as we move it farther away from the pinhole its size increases, but the sharpness of the picture is not materially improved in either case. As we increase the size of the image, however, we cause the light entering the pinhole to cover a larger space, and so decrease the illumination at any point of the image. Carefully noting these things, we get a practical knowledge of the pinhole as a means of forming and projecting images, and see that, although we can make a photograph with it as a matter of curiosity or experiment, it has neither the definition nor light intensity (volume of illumination) required for practical photography. If we enlarge the pinhole the image gains in illumination or brightness, but loses in definition, until, by continued enlargement of the aperture, we lose the image altogether in a blurred patch of light. If, instead of enlarging the pinhole, we make other pinholes in a group about it we get more light, but also a multiplicity of images overlapping each other on the card, because the ray entering through each aperture brings its own image to the card, and the result is confusion. All this enables us to see that what we need is a large aperture to admit plenty of light and some means by which we can bend all the rays of light passing through the aperture to one meeting-place or focus on the card, so that the images projected by the rays will be coincident or combined at one point.

**Refraction of Light.**

This brings us to the lens as a means of producing images. We have seen that the confusion of images produced by a large aperture resulted from a lack of coincidence between the images formed by the rays of light passing through the sides of the aperture and those formed by the rays passing through the centre of the hole. We need, therefore, some means of bending these outer images inward until they will coincide with the image formed by the central rays. This is accomplished by what is known as refraction. When light passes from a medium of given density (such as air) into another medium of different density (such as water, glass, etc.) the rays are bent or refracted from their original direction, the amount of degree of refraction depending upon the density of the medium and the angle of incidence. A very simple demonstration of this may be had with a prism. In Fig. 2 the ray R enters a glass prism at O. The density of the prism differing from that of air, the ray is bent and, instead of proceeding to X, passes to O′. There it emerges into the air again and so is again bent, proceeding in the direction O′ R′ instead of passing to Z. Note here that rays of light entering a prism are refracted or bent toward its base, a fact which, as we will see, has an important bearing on the construction of a lens.

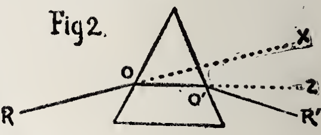


Fig2.

**Dispersion by a Prism.**

If we place our prism in the beam of light entering through the pinhole, we will see that it does more than simply bend the light out of its course. It also disperses it or decomposes it into the several colors which together form white light. This decomposition of a beam of white light into its primary constituents, no matter what substance the prism is made of, always occurs in the same order, *viz.:* violet, blue, green, yellow, orange, red, as shown in Fig. 3, but the division of the rays—*i.e.*, the degree of dispersion—depends upon the nature of the glass used for the prism. The band of colors obtained by the dispersion of white light with a prism forms a spectrum. It will be observed that, in the above figure, the violet ray is bent to a greater degree than the yellow ray, hence the former is known as the ray of greatest refrangibility (capacity of being bent), and the latter as that of less refrangibility. Note here that lenses are usually composed of "crown" and "flint" glass, and that "flint" glass is more dispersive than "crown," a fact which is immensely useful in making lenses, inasmuch as by combining glasses of different dispersive power the dispersion of light effected by one may be counterbalanced by the dispersion of the other, so that the ray may be transmitted practically intact to its focus. (See Fig. 8.)

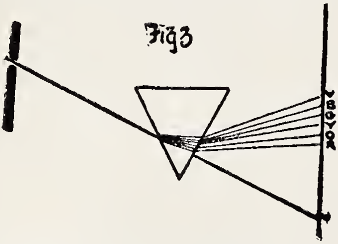


Fig 3

**Simple Lenses.** Let us now take two prisms and put them together, so that the base of one rests on the base of the other, as in Fig. 4. We see, at once, that the parallel rays of light A and B, striking the prisms at C and D, will be bent or refracted so as to cross each other, as they do at E. This gives us the simplest form of a lens, Fig. 5, a double-convex or converging lens, so called because its form causes rays of light falling upon it to converge until they meet on the axis—an imaginary line drawn through the centre of the lens shown by the arrow in the figure. The

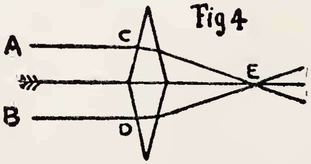


Fig 4

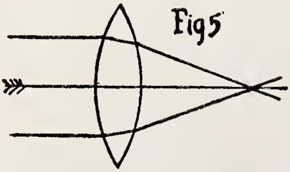


Fig 5

point where "parallel" rays—*i.e.*, rays coming from an infinite distance—transmitted by such a lens meet is known as the focus of the lens; the distance between this focal point and the centre of the lens, marked O in the figure, is known as the focal length of the lens. If we place the two prisms together, apex to apex, as in Fig. 6, we will see that the rays of light are bent toward the base of each prism as before, and so diverge and can never meet. This gives us another primary lens, Fig. 7, a double-concave or diverging lens, so-called because its form causes rays of light falling upon its surfaces to diverge. A lens, then, may be considered as practically a series of prisms formed by a single piece of glass, its faces being spherical instead of an infinite number of flat surfaces. But we may cut our prisms across, as in Fig. 8, and we have two prisms which, as a whole, will act with light as do other prisms. We may therefore have lenses with spherical and plane surfaces. The six primary lenses most commonly used in the manufacture of photographic lenses are given in Fig. 9. These are named respectively :

Fig 6

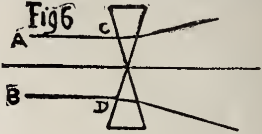


Fig 7

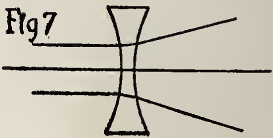


Fig 8

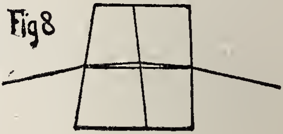
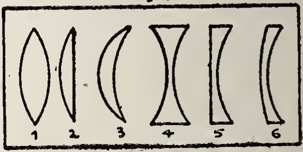


Fig 9



1. Double-convex
2. Plano-convex } converging or positive lenses.
3. Convex meniscus
4. Double-concave
5. Plano-concave } diverging or negative lenses.
6. Concave meniscus

**Axis of a Lens.**

As one or more surfaces of these lenses are portions of spheres, the curved surface or surfaces must be struck from a centre. Thus in Fig. 10 it is seen that the surfaces of the lens are struck from C and C′. The line which connects the centres from which the two surfaces of the lens are struck is known as the principal axis of the lens. Rays of light which coincide with the principal axis of a lens are not refracted, but pass straight through the lens. We have now an elementary knowledge of six simple lenses. None of these, however, are available for photographic purposes on account of certain defects which prevent them from forming true images. A few of these defects we will consider very briefly.

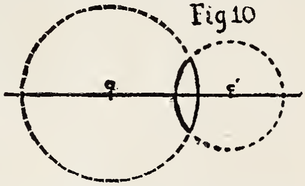


Fig 10

**Chromatic Aberration.**

We saw in Fig. 3 that when a beam of light passes through a prism it is refracted and dispersed at the same time, the color rays being divided according to their varying refrangibility and the dispersive power of the glass composing the prism. We know, also, that a lens is practically a series of prisms. If then we attempt to photograph with a single lens, such as the double-convex, the passage of light will produce the same effect as is produced by a prism. This is clearly shown, in an exaggerated way, in Fig. 11. Here a ray of light which strikes the lens, is refracted and dispersed, and, as we saw in Fig. 3, the violet

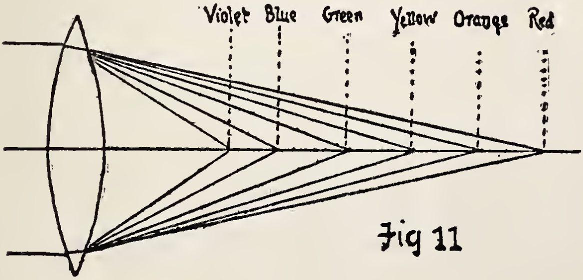


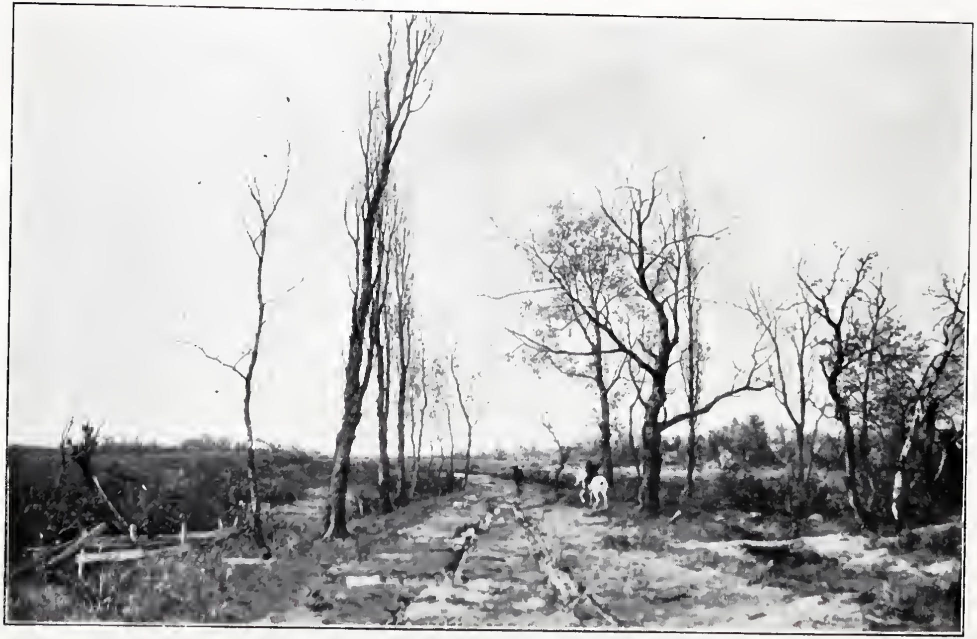
Fig 11

rays are bent out of their course at a more acute angle than the yellow rays. It is obvious from this that the images formed by the various color rays will not meet at the same point on the axis of the lens, as the violet ray, being most refrangible, will focus and give a sharp image nearer the lens than the yellow rays, which are less refrangible. This is positive chromatic aberration. Now the image we focus with the eye on the ground-glass of the camera is formed by the yellow rays, while the image we get on the photographic plate is that given by the blue and violet rays which, as we see, come to a focus on a plane separate from the yellow rays. The lens must therefore be corrected so that the yellow and violet rays at least will come to a focus at one point. This is accomplished by combining positive (converging) and negative (diverging) lenses of different dispersive power, the aberration of the one balancing that of the other. When this is accomplished the lens is said to be "achromatic." Almost all lenses made to-day are "achromatised"—*i.e.*, so arranged that chromatic aberration is as nearly eliminated as is possible. When a lens is so corrected, with regard to its aberrations of chromatism, that three positions of the spectrum are brought into coincidence—*i.e.*, focus at the same point—instead of two positions only, it is said to be apochromatic. Zeiss and Voigtlaender advertise that their lenses may be had either achromatic or apochromatic. The advantages of lenses so corrected for color-process reproduction are evident.

**Spherical Aberration.**

Spherical aberration is defined as an inability in a lens having spherical surfaces to bring to one point or focus all the rays which are transmitted through it. This defect has nothing in common with chromatic aberration, and the one may exist in a lens which is corrected as far as the other is concerned. It arises from the sphericity of the lens surfaces and, consequently, in converging (positive) lenses we have positive spherical aberration, and in diverging (negative) lenses we have negative spherical aberration. Fig. 12 shows, in an exaggerated manner, the effect of positive spherical aberration with a double-convex lens. The rays BB′ are transmitted through the central portion of the lens, and suffering little refraction, are converged to a focus at F; the rays AA′, being transmitted nearer the margins of

*Supplement to "The Photo-Miniature," April, 1899*



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A NOVEMBER DAY: BY GEORG VEDER

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the lens, come to a focus at f, nearer the lens. The images formed by rays intermediate between AA′ and BB′ focus at points between f and F, thus causing confusion and indistinctness in the image. Spherical aberration may be corrected in part by the use of a diaphragm placed close to the lens to cut away or "stop" the marginal rays from being transmitted, but this necessarily reduces the illumination. The correction of spherical aberration is therefore generally accomplished by combining negative and positive lenses having opposite aberrations in right proportion so that the one balances the other, as shown in Fig. 13, in which converging and diverging lenses are combined.

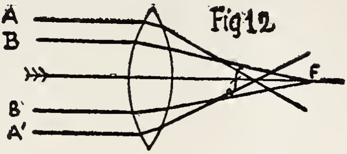


Fig 12

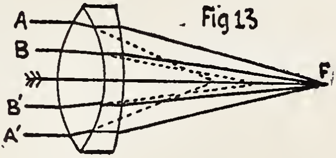


Fig 13

**Aplanatic Lens.** When a lens has been fully corrected for chromatic and spherical aberration, so that we can use it with a large working aperture—*i.e.*, fairly wide open—it is said to be aplanatic.

**Curvilinear Distortion.** Curvilinear distortion is another defect inherent to the single lens which should be mentioned. It is related to spherical aberration, and its cause is difficult to explain in a few words. Its effects are made evident when we attempt to photograph, with a single lens, a network of squares, as in Fig. 14. If the exposure is made with the diaphragm, or "stop," in front of the lens, the network design is distorted and appears on the negative like Fig. 15. With the "stop" placed behind the lens, the distortion is reversed, and the design appears as in Fig. 16. It is evident that this defect entirely prevents the use of a single lens for copying or photographing buildings or

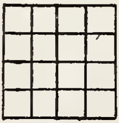


FIG 14

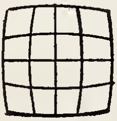


FIG 15

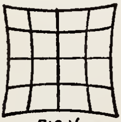
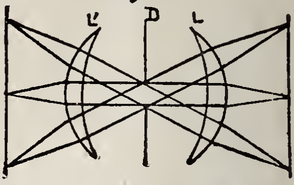


FIG 16

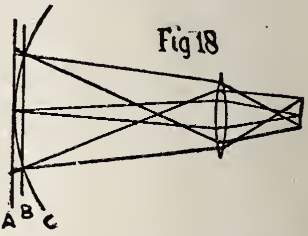
other objects where there are lines at the edges of the picture. The remedy is obvious; by combining two single lenses and placing the "stop" between them, as in Fig. 17, the distortion produced by the lens L, with the diaphragm D behind it, is corrected by the lens L on the other side of the diaphragm. In this way we form a "doublet" or "rectilinear" lens, which is so-called because it reproduces straight lines as such in all portions of the picture-image.

Fig 17



**Curvature of Field.** Curvature of field is another defect possessed by many lenses. Hitherto we have spoken as though the lens brought its image to a focus on a plane surface, such as the ground-glass of the camera. As a matter of fact, however, the image projected by a lens comes to a focus on a curved field, so that our ground-glass and plates should be concave in form. The effect is seen in Fig. 18. Here the line C represents such a curved field; it will be seen at once that if the focus is secured on the ground-glass A, only the central part of the object photographed will be sharp, while the margins of the picture-image will be more or less out of focus and indistinctly defined. If the ground-glass is placed at C, the margins of the image will be sharp, but the central portion will be out of focus. The best result, therefore, will be obtained by focusing the image between these two points, A and C, and so distributing the definition. In the anastigmat lenses of to-day this defect is largely overcome, so that flatness of field is secured with a large aperture.

Fig 18



**Flare and Flare-Spot.** What is known as flare may be defined as an abnormal transmission of light through the lens whereby the brilliancy of the image is impaired. It may be caused by reflections from the mounting of the lens or from the diaphragm, but is usually the result of reflections from the interior surfaces of the lens. All light entering a lens and not directly transmitted is reflected and re-reflected among the interior surfaces of the lens until it is eventually transmitted and degrades the image. When this light is condensed into a definite shape or secondary image it is known as a flare-spot or " ghost." It occurs with the use of small apertures in both landscape and doublet lenses, and even with some lenses of the anastigmatic type. To test a lens for flare tendencies, screw it into a camera and, in a darkened room, focus upon a gas-flame, behind which is placed a piece of black cloth. The image will be sharp, bright, and inverted. Now move the camera so that the inverted image passes to a position between the centre of the ground-glass and its right-hand margin. If the lens gives a flare-spot, there will be seen on the ground-glass, between its centre and left-hand margin, a ghostly non-inverted image of the gas-flame. At times the flare-spot appears as a circular patch of light on the negative, and is usually considered to be an image of the diaphragm aperture. This may be observed when photographing a scene where a bright sky and dark foliage are in contrast. In computing the formulæ of anastigmatic lenses every precaution is taken to compensate the evils arising from the reflections due to the combination of many glasses. This is arranged so that the reflections are brought into such positions that they exercise no prejudicial effect on the brilliancy of the image. So far has this correction been carried that it will be found that some anastigmatic doublets are hardly inferior to single lenses in the production of brilliant images, while the triplet combinations compare favorably with the ordinary objectives consisting of only two combinations.

**Astigmatism.** Astigmatism is a defect inherent to all the older forms of lenses which has been approximately eliminated only during recent years in the "anastigmatic" lenses made possible by the new kinds of optical glass. The word means "without a point," and, as used with reference to the lens, may be defined as the inability of a lens to bring vertical and horizontal lines (such as the plus + sign boldly printed on a white card) to a focus at the same time, although both lines lie upon the same plane. It is important that the reader should well understand this defect of the ordinary photographic lens, because it is in its correction or elimination that the superiority of the "anastigmat" over the older lenses is apparent, and also because its elimination enables us to secure sharper definition over the whole of the picture-image, a greater angle and, consequently, greater intensity, with flatness of field and covering power. I, therefore, make room here for a very clear explanation of astigmatism, given by Mr. L. J. R. Holst in a recent paper read before the American Academy of Sciences. He says: "Let us imagine a cylindrical pencil of light rays to strike an optical system at a certain angle with its axis; we can then construct two planes, one of which passes through the axis of the optical system, and through the axis of the cylindrical pencil of light, and the second one also going through the axis of the cylindrical pencil, but placed at right angles with the first-mentioned plane (Fig. 19). We find that a lens will refract the rays reaching it in these two different planes to a different focus. The focus of the warped rays lies behind the focus of the normal rays, and the difference of these two foci increases rapidly with the angle at which the cylindrical pencil of light strikes the lens.’ As an illustration, let us suppose that we have to photograph a pair of twin lighthouses, so arranged that the light from one comes at the centre of the focusing screen, and the other at the outer edge. The central one we can bring to a correct focus without difficulty, but the other one will appear out of focus. If we rack *in* our camera the point of light gradually assumes the appearance of a horizontal streak, instead of a point. Racking the camera *out*, we find that the streak gradually fades, giving place to a vertical streak, and we shall easily discover that when going back to the original position, which gave the best definition for the other

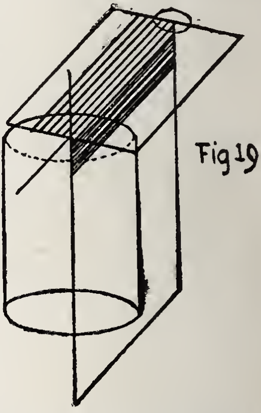


Fig 19

light, the picture of the light at the edge of the ground-glass is a cross (Fig. 20) of altogether imperfect definition, and no position of the ground-glass can be found at which this latter light is sharply reproduced. To overcome this aberration, known as astigmatism, the use of the new Jena glass, combining high refractive and high dispersive indexes, is absolutely indispensable." In testing a lens for astigmatism crossed vertical and horizontal lines, as, for instance, the cross-bars of a window, should be focused at the centre and then at the margins of the ground-glass. If the cross-bars preserve their form and distinctness in both positions, the lens may be assumed to be "anastigmatic"—*i.e.*, free from astigmatism. Lenses which are truly "anastigmatic" give sharper definition over the whole of the image than was possible with the older lenses; their high degree of correction also permits of shorter focal length and correspondingly greater angle and intensity, with increased covering power.

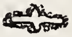


Fig 20

Having now touched upon the elementary forms of lenses and their inherent defects, let us look into the properties of lenses so that we can judge of their advantages for particular branches of work and compare them with each other.

**Focal Length.** The first thing we want to know about a lens is its focal length. In any manual of photographic optics the reader will find several precise methods by which to ascertain the correct focal length of single or "doublet" lenses. It will be sufficient here to say that the focal length of a single lens, such as is fitted to nine-tenths of the cameras sold under ten dollars, is the distance between the lens and the ground-glass or plate when a distant object is focused. In doublet or "rectilinear" lenses, the distance between the diaphragm or "stop" and the ground-glass, under the same conditions, will be approximately correct. This latter is usually spoken of as the "equivalent focus." The point where parallel rays—*i.e.*, rays coming from an infinite distance, such as the sun—meet after passing through a lens is known as the principal focus.

**Conjugate Foci.** Images of objects at varying distances from the camera necessarily focus at varying distances (foci) from the lens. These focal points are known as conjugate foci, and have a direct bearing on the light intensity of a given aperture—*i.e.*, govern the rapidity of the lens—when enlarging or reducing a picture to any given size. A knowledge of conjugate foci is also useful in making the focusing scale such as is usually found on hand-cameras, which tells when objects beyond a certain distance will be in focus without the trouble of actual focusing; so also a knowledge of conjugate foci enables the copyist to make his enlargement or reduction any desired size without the trouble of calculating. This operation is facilitated by the table on page 15, from the *British Journal Almanack*. By a continuation of this table the photographer can ascertain what length of studio he needs to get a full-length figure upon his "cabinet" plate.

**"Fixed" Focus.** In inexpensive hand-cameras with small lenses the change of position of the plate when focusing for near and distant objects is so small that it is barely appreciable. Manufacturers of such cameras, therefore, for 3½ × 3½ inch pictures or smaller, usually fix the lens at a distance from the plate which is correct for all objects six feet or more from the camera. Such lenses are said to be of "fixed" or universal focus. The subjoined table shows the distances at which all objects will be in focus with lenses of different focal length and varying apertures.

DR. J. J. HIGGINS'S TABLE OF DISTANCES AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS.

| Equivalent Focus. | *f*/5 | *f*/6 | *f*/7 | *f*/8 | *f*/9 | *f*/10 | *f*/11 | *f*/12 | *f*/13 | *f*/14 | *f*/15 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 inches.. | 42 | 35 | 30 | 26 | 23 | 21 | 19 | 17½ | 16 | 15 | 14 |
| 5½ " .. | 50½ | 42 | 36 | 32 | 28 | 25 | 23 | 21 | 19 | 18 | 17 |
| 6 " .. | 60 | 50 | 43 | 38 | 34 | 30 | 27 | 25 | 23 | 21 | 20 |
| 6½ " .. | 70½ | 59 | 50 | 44 | 39 | 35 | 32 | 29½ | 27 | 25 | 23½ |
| 7 " .. | 82 | 68 | 59 | 51 | 45 | 41 | 39 | 34 | 31 | 29½ | 27 |

Calculated for a confusion disk of less than $\frac{1}{100}$ of an inch.

**Multiple Foci.** Some doublet lenses are so constructed that either of their combinations may be used separately as single, or landscape, lenses, the focal length of the back combination (that usually used) being about double the focal length of the original lens. There are also lenses, such as the Gund-

| Focus of Lens, inches. | TIMES OF ENLARGEMENT AND REDUCTION. | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 inches. | 2 inches. | 3 inches. | 4 inches. | 5 inches. | 6 inches. | 7 inches. | 8 inches. |
| 2 | 4<br>4 | 6<br>3 | 8<br>2⅔ | 10<br>2½ | 12<br>2⅖ | 14<br>2⅓ | 16<br>2 2/7 | 18<br>2¼ |
| 2½ | 5<br>5 | 7½<br>3¾ | 10<br>3⅓ | 12½<br>3⅛ | 15<br>3 | 17½<br>2 11/12 | 20<br>2 6/7 | 22½<br>2 13/16 |
| 3 | 6<br>6 | 9<br>4½ | 12<br>4 | 15<br>3¾ | 18<br>3⅗ | 21<br>3½ | 24<br>3 3/7 | 27<br>3⅜ |
| 3½ | 7<br>7 | 10½<br>5¼ | 14<br>4⅔ | 17½<br>4⅜ | 21<br>4⅕ | 24½<br>4 1/12 | 28<br>4 | 31½<br>3 15/16 |
| 4 | 8<br>8 | 12<br>6 | 16<br>5⅓ | 20<br>5 | 24<br>4⅘ | 28<br>4⅔ | 32<br>4 4/7 | 36<br>4½ |
| 4½ | 9<br>9 | 13½<br>6¾ | 18<br>6 | 22½<br>5⅝ | 27<br>5⅖ | 31½<br>5¼ | 36<br>5 1/7 | 40½<br>5 1/16 |
| 5 | 10<br>10 | 15<br>7½ | 20<br>6⅔ | 25<br>6¼ | 30<br>6 | 35<br>5⅚ | 40<br>5 5/7 | 45<br>5⅝ |
| 5½ | 11<br>11 | 16½<br>8¼ | 22<br>7⅓ | 27½<br>6⅞ | 33<br>6⅗ | 38½<br>6 5/12 | 44<br>6 2/7 | 49½<br>6 3/16 |
| 6 | 12<br>12 | 18<br>9 | 24<br>8 | 30<br>7½ | 36<br>7⅕ | 42<br>7 | 48<br>6 6/7 | 54<br>6¾ |
| 7 | 14<br>14 | 21<br>10½ | 28<br>9⅓ | 35<br>8¾ | 42<br>8⅖ | 49<br>8⅙ | 56<br>8 | 63<br>7⅞ |
| 8 | 16<br>16 | 24<br>12 | 32<br>10⅔ | 40<br>10 | 48<br>9⅗ | 56<br>9⅓ | 64<br>9 1/7 | 72<br>9 |
| 9 | 18<br>18 | 27<br>13½ | 36<br>12 | 45<br>11¼ | 54<br>10⅘ | 63<br>10½ | 72<br>10 2/7 | 81<br>10⅛ |

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for six in the first vertical column, and carry his eye to where these two join, which will be at 30—7½. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the lesser, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction. If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for six in this column and multiply by 2, and so on with any other numbers.

lach *Rectigraphic*, Dallmeyer's *Stigmatic*, and the Zeiss *Satz Anastigmats*, the construction of which gives three lenses of varying focal lengths. The general usefulness of such lenses will be apparent. It should be remembered, however, that when only one combination is used the lens is no longer rectilinear, nor will it be as rapid as a doublet, because its character as a single lens necessitates the use of small diaphragms which reduce the amount of illumination reaching the plate.

**Depth of Focus.** "Depth of focus" is commonly said to be a property possessed by a lens of giving an equally sharp image of objects situated at varying distances from the camera. Correctly speaking, however, depth of focus is not a property peculiar to any particular form of lens or combination of lenses. A lens working at full aperture—*i.e.*, without being "stopped" down—will rarely render sharp objects near and distant from the camera; by using a small diaphragm the confusion caused by the outer or marginal rays entering the lens is cut off or reduced, and so an apparent "depth" is secured, but invariably by sacrificing illumination, and therefore rapidity of action. Of two lenses of the same intensity (rapidity) but differing in focal length, the lens of shorter focus will give the greater depth of definition. Of two lenses of identical focal length, but one having greater intensity (rapidity) than the other, the more rapid lens will apparently have less depth of focus; but when this lens is "stopped" down by the use of a diaphragm to the same rapidity as the slower lens, the two lenses will have the same depth of focus. In other words, depth of focus, with any given stop, is an invariable quality in different lenses of the same focal length, regardless of their construction.

**Aperture.** The diameter of the cylinder of light which a lens can receive and transmit is its "aperture." When the diaphragm is in front of the lens, the hole in the diaphragm is the aperture of the lens, but if the diaphragm is behind a part of the lens, as in lenses of doublet form, the incident light passes through a lens first and the hole in the diaphragm no longer indicates the true aperture of the lens. In this case the aperture is larger than the hole in the diaphragm because the lens condenses the light before it reaches the diaphragm. In order to find the aperture of a lens, first focus a distant object and then replace the ground-glass by a sheet of cardboard pierced at its centre with a pinhole. Now, in a dark room, place a candle behind the pinhole and place a piece of ground glass before and close to the lens, when a disk of light will appear the diameter of which is the "aperture" of the lens with the diaphragm used.

Diaphragm or "Stop."

The diaphragm, or "stop," plays so important a part in the use of lenses that it demands separate consideration. A diaphragm is a piece of metal (blackened) with a circular aperture at its centre, which is placed before the lens, if it is a single lens (landscape), or between the two elements if it is a doublet or "rectilinear" lens. An *iris* diaphragm consists of several segments of a circle, of metal or vulcanite, working on pivots attached to a ring in the lens-mount. By rotating this ring the circular aperture formed by the segments may be made smaller or larger at will. In the first place, the diaphragm evens the illumination of the plate by reducing the axial rays and bringing them more nearly to the effective diameter of the oblique rays, so that the amount of illumination reaching every part of the plate is fairly equalized. By the use of diaphragms also we increase the defining power of the lens over a larger area by the correction of aberrations, and get greater depth of focus. This action of a diaphragm may be simply illustrated by showing the part played by the diaphragm used with a landscape lens. In Fig. 21 a number of parallel rays are seen to strike obliquely upon the flattest surface of a lens, all of them taking different directions after their transmission. It is obvious that the

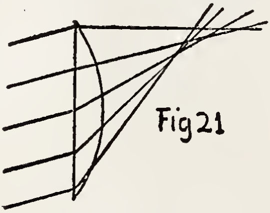


Fig 21

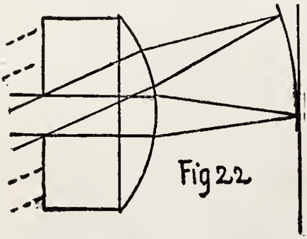


Fig 22

image formed by the marginal rays will not be sharp, owing to the outer rays being bent in a greater degree than any of the others between them and the central rays. If all the rays were transmitted to one point we would then have a perfect lens, but it cannot do this owing to the aberration caused by the spherical surface of the glass (see Spherical Aberration). Now, if we place a diaphragm in front of the lens, as seen in Fig. 22, it is apparent that only those rays which may be transmitted to a sharp focus will be admitted to the lens, the oblique rays (save those which pass through the diaphragm) being debarred access to the lens by the diaphragm and mount of the lens. Another important use of the diaphragm is to modify the amount of light passing through the lens, and therefore control the length of exposure required by the plate. The influence of the diaphragm aperture on exposure has been so clearly explained by Mr. F. Dundas Todd, in his *Reference Book*, that it would be superfluous to attempt to put the matter in a simpler way. He says: "Here is the whole matter in a nutshell. First, the volume of light that passes through a diaphragm is proportionate to the *area* of the aperture. Second, the areas of circles are proportionate to the squares of their diameters. Anyone who can grasp these two facts can understand all that need be known about diaphragms.

"The first maxim may be simply illustrated. If the *area* of the largest stop in a lens be two square inches, it will permit the passage of twice the amount of light of a diaphragm whose *area* is only one square inch. Therefore, to get the same result the exposure with a smaller stop would require to be double of that with the larger, and vice versa. The second maxim may be illustrated thus: Suppose the largest stop of a lens to have a diameter of two inches, and another stop in the same lens to have a diameter of one inch. In other words, one is half the diameter of the other, and the first assumption would be that the smaller would require double the exposure of the larger stop. But maxim one says the volume of light that passes depends upon the *area* of the stop, and not its diameter. So we apply maxim two, which says that the areas of circles are proportionate to the square of the diameters. The circles under consideration are in diameter two inches and one inch. These numbers squared give a ratio of 4 to 1. So that the area of the larger circle is four times that of the smaller, and therefore passes four times more light.

"Until a few years ago the size of stops depended entirely upon the humor of the maker and bore no particular relationship to each other, with the result that although the photographer might know the correct exposure to give with one particular stop of a lens, he could only learn by experience the correct exposure with any other stop. And if he, by any chance, had to work with a lens with which he was not familiar he was completely at sea. Order out of this chaos was brought about by the Photographic Society of Great Britain, who introduced what is now popularly known as the Uniform System (generally abbreviated to U. S.), in which the stops are numbered according to their *area*. Sometimes the numbering is expressed in terms based on the proportion that the *diameter* of the stop bears to the *focal length* of the lens. Both methods of numbering mean exactly the same thing, and both are in constant use, some preferring one, some the other. Possibly the latter method is the simpler, and is in more frequent use than the former.

"To one who understands vulgar fractions the system is exceedingly simple. At the risk of being considered too explicit, it may be permitted to say that in a vulgar fraction it is understood that the upper figure of a fraction, called the numerator, is to be divided by the lower figure, known as the denominator. Thus ¼ means that 1 is to be divided by 4. We have here a shorthand method of writing a little problem in arithmetic. The very same method is adopted in writing the relationship between the diameter of the stop and the focal length of the lens. If we want to say that it is one-fourth the focal length, it would be written $\frac{\text{focal length}}{4}$. But focal length is too long to write each time, and so it is shortened to *f*, and we have *f*/4.

**Diaphragm Systems.**

"Let us put all these facts together and see the result. In the Uniform System it is arranged that stops shall be numbered from the same starting-point, which is selected as *f*/4, and that the area of each stop shall be exactly double of the one smaller, and, of course, half the area of the one bigger. This fact is indicated in the numbering. The largest stop is No. 1; and as the second, being half the area, will require *double* the exposure, it is No. 2;

the third, being one-fourth the area of the first, will require *four* times the exposure, and is therefore called No. 4. Figuring out on this basis we get the following series :

Nos. 1, 2, 4, 8, 16, 32, 64, 128, 256.

" This is the first method of numbering. In the second method the number is expressed in terms of the proportion between the focal length and the diameter of the stop. No. 1, we have just seen, is one-fourth the focal length of the lens, which is written *f*/4. The diameter of No. 2 must be such that the area will be half of No. 1. This diameter is got by squaring 4=16, multiplying by 2=32, and extracting the square root =5.6 (see our second maxim). Stop No. 2 may therefore be written *f*/5.6. By working out the remaining figures we get our series thus :

| Number | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 |
|---|---|---|---|---|---|---|---|---|---|
| | *f*/4 | *f*/5.6 | *f*/8 | *f*/11.3 | *f*/16 | *f*/22.6 | *f*/32 | *f*/45 | *f*/64 |

With lenses numbered on this basis, if the exposure be known with any one stop of any lens, the exposure with any other stop or any other lens may readily be calculated. Two simple rules guide the whole calculation. 1. All lenses working under the same conditions will require the same exposure with the same stop-number. Thus, if we set up two cameras on the same view, one with a lens of say twelve inches focal length, and the other with a lens of six inches focal length, and use both with the same stop-number, the exposure with both lenses will be exactly the same, provided, of course, that the same brand of plates be used and the exposures are made at the same time. 2. That the exposure with any particular stop is exactly half of the next one smaller and double that of the next one larger. To illustrate: If the smallest stop of the lenses, usually *f*/64, requires one second's exposure, then the next largest, *f*/45, will only require one-half second; *f*/32 one-quarter second, and so on, till we reach *f*/8, which will need only one-sixty-fourth of a second."

**"German Diaphragm Numbers."**

Zeiss lenses have their diaphragms numbered on a system suggested by Dr. Rudolph, in which the actual working aperture of the lens is taken as the diaphragm aperture.* The table on page 22 shows the con-

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* See aperture.

## COMPARATIVE TABLE OF DIAPHRAGM NUMBERS.

| f/ | U. S. System. Ross. Gundlach. | Goerz. | All Zeiss Lenses (old). | Zeiss Lenses (new). | Voigtlaender Collinear. | Dallmeyer. | f/ | U. S. System. Ross. Gundlach. | Goerz. | Zeiss (old). | Zeiss (new). | Collinear. | Dallmeyer. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.16 | | | | | | 1 | 18 | | | | | | |
| 3.2 | | | 1024 | 256 | | | 20 | | | | | | 40 |
| 4 | 1 | | | | | | 22.36 | | | | | 32 | 50 |
| 5 | | | | | | 2½ | 22.6 | 32 | 48 | | | | |
| 4.5 | | | 512 | 128 | | | 25 | | | 16 | 4 | | |
| 5.66 | 2 | 3 | | | 2 | | 27.36 | | | | | | 75 |
| 6.3 | | 4 | 256 | 64 | 2½ | 4 | 31.62 | | 96 | | | | 100 |
| 7.7 | | 6 | | | 4 | 5 | 32 | 64 | | | | 64 | |
| 8 | 4 | | | | | | 36 | | | 8 | 2 | | |
| 8.66 | | | | | | 7½ | 38.7 | | | | | | 150 |
| 9 | | 9 | 128 | 32 | | | 44.72 | | 192 | | | | 200 |
| 10 | | | | | | 10 | 45.2 | 128 | | | | 128 | |
| 11.13 | 8 | 12 | | | 8 | | 50 | | | 4 | 1 | | 250 |
| 12.25 | | | | | | | 54.77 | | | | | | 300 |
| 12.5 | | | 64 | 16 | | 15 | 63.25 | | 384 | | | | 400 |
| 14.14 | | | | | | 20 | 64 | 256 | | | | 256 | |
| 15.81 | | | | | | 25 | 70.71 | | | | | | 500 |
| 16 | 16 | 24 | | | 16 | | 71 | | | 2 | | | |
| 17.32 | | | | | | 30 | 100 | | | 1 | | | |

[NOTE.—Dallmeyer is now marking some of his lenses with the *f*/ value. All the makers of Zeiss and Goerz lenses use the system of numbering originated by Messrs. Zeiss and Goerz.]

nection between the ratio-aperture and the stop-numbers :

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Ratio aperture*. | *f*/100 | *f*/71 | *f*/50 | *f*/36 | *f*/25 | *f*/18 | *f*/12.5 | *f*/8.8 | *f*/6.3 | *f*/4.5 |
| Stop-number .... | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 |

Goerz has adopted still another system, based on the relative time of exposure, and is practically the system recommended, and, we believe, used by Dallmeyer, but numbered differently. The following table shows the Goerz system of numbering :

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Ratio aperture....... | *f*/6.3 | *f*/7.7 | *f*/11 | *f*/15.5 | *f*/21.9 | *f*/31 | *f*/43.8 | *f*/62 |
| Stop-number ....... | 4 | 6 | 12 | 24 | 48 | 96 | 192 | 384 |

For the convenience of those possessing lenses by various makers who use different systems of diaphragm-numbering, the table on page 21 is given as likely to be of service.

**Rapidity.** The rapidity of a lens depends on the relation of its aperture to its focal length, and is expressed by the fractional number indicating the ratio of the largest stop to the focal length with which it is possible to get a sharply defined image at the centre of the plate. Thus, if the aperture of the largest diaphragm is one inch, and the equivalent focus of the lens eight inches, the rapidity of the lens is expressed as *f*/8. In comparing two lenses of the same focal length, therefore, that which has the largest available aperture is the more rapid of the two. Portrait-lenses, with their large apertures, of *f*/3 or larger, are, of course, lenses of the greatest rapidity, but they are a class in themselves and not generally included when rapid lenses are referred to. Until recently a rectilinear lens working at *f*/8—*i.e.*, with a stop the diameter of which is one-eighth of its focal length—was considered to be a rapid lens, and this speed is sufficient under fairly favorable conditions even for subjects with movement such as a train in motion, etc. The introduction of the modern anastigmat, however, has given us lenses closely approaching the portrait-lens in speed, without

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[*] Zeiss has recently changed his ratio unit from *f*/100 to *f*/50

This comparative table should (for the later Zeiss lenses) read as follows :

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Ratio aperture. | *f*/50 | *f*/36 | *f*/25 | *f*/18 | *f*/12.5 | *f*/9 | *f*/63 | *f*/4.5 | *f*/3.2 |
| Stop-number.. | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 |

its peculiar limitations, among which, as the most rapid lenses of to-day, may be mentioned the Zeiss *Planar*, Dallmeyer's *Stigmatic*, the Goerz *Double Anastigmat*, and Voigtlaender's *Collinear*.

To compare the rapidities of lenses, let us suppose that we have three lenses, working at *f*/4, *f*/6, and *f*/8 respectively. By squaring the denominators of the three fractions we get the relative *exposures* which must be given to each in order to obtain identical results, *viz.:*

16, 36, and 64, or as 1, 2¼, and 4.

It is thus apparent that the lens working at f/8 has only one-fourth the intensity of that working at *f*/4, and will require four times the exposure.

**Angle of View.** By this is meant the angle subtended by the view which the lens throws on the plate. Every lens having the same focal length embraces the same angle of view on a plate of given size because it is the focal length of the lens which determines the angle of view thrown on a plate of any given size. The angle of view embraced by a lens may, however, vary with the size of plate used, and hence we have the terms wide-angle, narrow-angle, and medium-angle lenses. If we have two lenses of equal focal length, one made to cover a 10 × 12 plate and called a narrow-angle lens, the other made to cover a 14 × 17 plate and called a wide-angle lens, will there be any difference in the pictures they make if exposed on 10 × 12 plates? No. Where then is the advantage of the wide-angle lens? Only in the capacity it possesses for covering a 14 × 17 plate, if that be necessary. This capacity results, in part, from its construction, the curvature of its surfaces being deeper than those of the narrow-angle lens, and so necessitating the use of a small diaphragm, for which reason wide-angle lenses are sometimes incorrectly spoken of as "slow."

The angle of view included by a lens is determined by the relation of the focal length of the lens to the base line of the picture-image given, and lenses are termed narrow, medium, or wide-angle, accordingly. To ascertain the width of angle of a lens, divide the base-line of the plate by the equivalent focus of the lens. This done, it will be easy to determine the angle of view by reference to the following table prepared by Dr. C. E. Woodman:

| If the quotient is | The angle is | If the quotient is | The angle is | If the quotient is | The angle is |
|---|---|---|---|---|---|
| | Degrees. | | Degrees. | | Degrees |
| .282 | 16 | .748 | 41 | 1.3 | 66 |
| .3 | 17 | .768 | 42 | 1.32 | 67 |
| .317 | 18 | .788 | 43 | 1.36 | 68 |
| .335 | 19 | .808 | 44 | 1.375 | 69 |
| .353 | 20 | .828 | 45 | 1.4 | 70 |
| .37 | 21 | .849 | 46 | 1.427 | 71 |
| .389 | 22 | .87 | 47 | 1.45 | 72 |
| .407 | 23 | .89 | 48 | 1.48 | 73 |
| .425 | 24 | .911 | 49 | 1.5 | 74 |
| .443 | 25 | .933 | 50 | 1.53 | 75 |
| .462 | 26 | .954 | 51 | 1.56 | 76 |
| .48 | 27 | .975 | 52 | 1.59 | 77 |
| .5 | 28 | 1. | 53 | 1.62 | 78 |
| .517 | 29 | 1.02 | 54 | 1.649 | 79 |
| .536 | 30 | 1.041 | 55 | 1.678 | 80 |
| .555 | 31 | 1.063 | 56 | 1.7 | 81 |
| .573 | 32 | 1.086 | 57 | 1.739 | 82 |
| .592 | 33 | 1.108 | 58 | 1.769 | 83 |
| .611 | 34 | 1.132 | 59 | 1.8 | 84 |
| .631 | 35 | 1.155 | 60 | 1.833 | 85 |
| .65 | 36 | 1.178 | 61 | 1.865 | 86 |
| .67 | 37 | 1.2 | 62 | 1.898 | 87 |
| .689 | 38 | 1.225 | 63 | 1.931 | 88 |
| .708 | 39 | 1.25 | 64 | 1.965 | 89 |
| .728 | 40 | 1.274 | 65 | 2. | 90 |

*Example.*—Given a lens of 13 inches equivalent focus; required the angle included by it on plates respectively 3¼ × 4¼, 4¼ × 6½, 6½ × 8½, 8 × 10, 10 × 12, and 11 × 14.

1. Dividing 4.25 by 13, we have as quotient .327—midway between the decimals .317 and .335 of our table; therefore the required angle is 18° 30′. Similarly:

| | | | | | | Degrees. |
|---|---|---|---|---|---|---|
| 2. | 6.5 | ÷ | 13 | = | .5; | corresponding to 28. |
| 3. | 8.5 | ÷ | 13 | = | .654; | " " 36. |
| 4. | 10 | ÷ | 13 | = | .77; | " " 42½. |
| 5. | 12 | ÷ | 13 | = | .923; | " " 49½. |
| 6. | 14 | ÷ | 13 | = | 1.08; | " " 57. |

**Covering Power: Illumination.** A lens is said to have perfect covering power when it will give a sharply defined image to the margins of the plate, which it is listed to cover, when focused with the largest diaphragm-opening. The better the definition given all over the plate, the better the lens is said to be. This is a detail which should have careful attention when testing or buying a lens, as it is important, at times, to have a lens which will "cover" beyond the limits of the plate used, as when the camera has to be tilted, or a rising or falling front is used, by which the lens is shifted from the centre toward the margins of the plate. This is illustrated in Fig. 23, and as there is a relation between the covering power of a lens and its field of illumination, the figures may serve to illustrate both features. The area which a lens will illuminate sufficiently for practical use is called its circle of illumination, and in proportion as a lens will give a sharply defined image to the edges of its circle of illumination does it excel in covering power and general usefulness.*

In almost all lenses the covering power and circle of illumination exceed the dimensions of the plate which the lens is listed to cover. In Fig. 23 we see that when the centre of the plate and the axis of the lens coincide, as shown at A, the plate is just covered and just illuminated, because the circles of illumination and definition are just sufficient to embrace the corners of the plate. If we photograph a high building with such a lens, and tilt the camera to get in the top of the building, or raise the front board carrying the lens, we, in effect, place the centre of the plate (B) below the axis of the lens (A), and, as shown by the dotted lines of the plate in the figure, the corners of the negative will be poorly illuminated, appearing under-exposed, and lacking in definition. If, however, we use a lens with a larger circle of illumination and greater covering power, as indicated by the dotted circle, we get equality of illumination all over the plate and a considerable area in which the plate may be moved, if necessary, without the fear

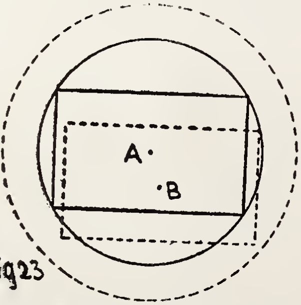

Fig23

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* The Goerz *Double Anastigmat* may be mentioned as a modern lens fulfilling this requirement in a special way.

of dark or ill-defined corners. Again, if the lens has a larger circle of illumination than is required for the plate with which it is generally used, it can be used to include a wider angle of view (on a larger plate) when a wide-angle lens is not at hand. This is well illustrated in Fig. 24. In this figure XX expresses the diameter of the circle of illumination possessed by the lens L. It will be seen that when used to cover the plate of which A B represent the diagonal, it gives a narrow angle of view with normal perspectives. If used to cover a larger plate, of which C D represent the diagonal, it gives a wide angle of view. If used to cover the largest plate, of which E F represent the diagonal, an extreme wide angle of view is obtained, with exaggerated perspectives, but the plate is still fully illuminated.

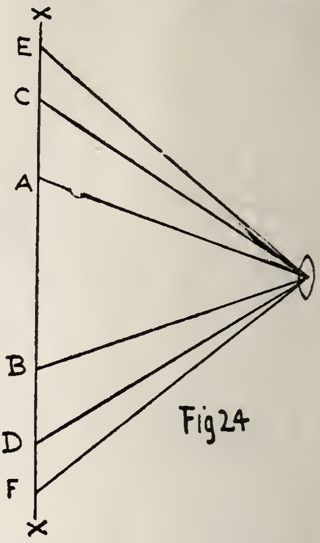


Fig 24

We are now ready to glance at the various forms of lenses obtainable commercially and to appreciate their uses and advantages for different kinds of work. The simplest way to do this will be to very briefly retrace the historical development of the lens by taking up the various types as introduced, thus showing the progress of photographic optics and the perfection attained in the lenses of to-day.

**Early Lenses.** Jean Baptiste Porta, the inventor of the camera obscura (1540–1615), employed, to form his picture-images, a simple converging lens of crown glass, with a diaphragm *f*/30 to limit the image to that formed by the central rays. The achromatic telescopic lens first made by Dollond, an English optician, in 1758, speedily supplanted this, giving an im-

**Landscape Lenses.**

age fairly free from chromatic aberration. Such a lens, used for making the first daguerreotypes (1839), is shown in the figures 25 and 26, and these forms are still largely used to-day. In 1865, J. H. Dallmeyer introduced his improved landscape lens, Fig. 27, in which the distortions were considerably reduced, and a greater angle, with larger aperture, was secured. Later, T. R. Dallmeyer modified this lens by adopting different kinds of glass in its construction, by means of which he gained for it the power of working at a larger aperture than was before possible. The most rapid single (landscape) lens of to-day is the Zeiss single anastigmat, Fig. 28, which is free from distortion within the angle at which it is to be used, from astigmatism, and has a very flat field. This anastigmat works at *f*/12.5, and its field has an angle of 85°, of which from 35° to 40° are actually used on the plates for which the lens is listed. These lenses are, therefore, sufficiently rapid for instantaneous exposures, and have, of course, the property of giving brilliant images with agreeable definition, which is the special feature of the single lens with its few glasses.

Fig 25

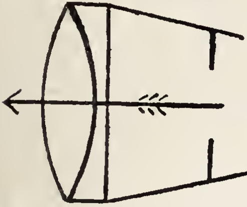


Fig 26

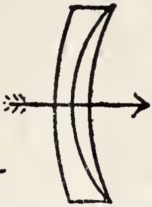


Fig 27

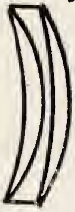
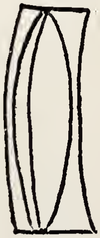


Fig 28



**Portrait Lenses.** The slowness of the achromatic lens and its uncorrected defect of curvature of field made photographers clamor for a lens rapid enough to take portraits with exposures of reasonable length. This resulted in the introduction of the portrait lens, the invention of which belongs to Petzval (1841), although the lens was manufactured by Voigtlaender. This lens, which has not yet been improved upon and is essentially the same as the portrait-lens of to-day, is shown in Fig. 29. Dallmeyer, in 1866, introduced a lens, very slightly differing from that of Petzval, the back element of which was so constructed that the two single lenses of which it was composed could be placed in contact with each other, or slightly separated, by which means the image could be sharply defined or the definition slightly diffused at will. The great feature of the portrait-lens is its intensity (rapidity), its construction enabling it to give perfect definition over a limited field (18°) at *f*/4, No. 1, U. S., with complete coincidence of chemical and visual foci. For large portrait-work—that is, on plates larger than 5 × 7 inches—however, the portrait-lens is not as advantageous as a modern anastigmat, because its depth of focus at *f*/4 is so slight that it is necessary to diaphragm the lens down to a smaller aperture than is available in the anastigmat; as, for instance, the Zeiss *Planar*, which will cover a plate 12 × 16 inches at *f*/5 of the focal length, 24 inches. For small portraits, with limited illumination, the portrait-lens proper is very much preferable.

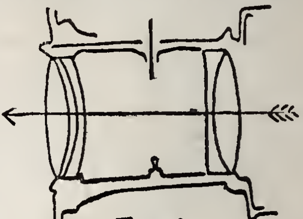


Fig 29

**Rectilinear Lenses.**

The doublet or "rectilinear" lens was first introduced by Steinheil (1866), in his *Aplanatic* lens, to meet the want of a lens rapid enough to permit of instantaneous photography, free from the distortions inherent to the single (landscape) lens, and embracing a wider angle of view than that given by the portrait-lens. The Steinheil aplanatic lens therefore marked an era in photographic optics, and all "rapid" lenses made since that time up to the introduction of the anastigmatic type have been similar in construction (with modifications) to the *Aplanatic*. Fig. 30 is sufficiently accurate to describe the rapid rectilinear type. The rectilinear lens has the property of rendering straight lines as such, hence its name; it is also more rapid than the single lens, its construction permitting a larger aperture in proportion to its focal length, with the correction of many of the defects of the single lens. According to their construction and covering power, rectilinears are spoken of as narrow-angle, medium-angle, and wide-angle lenses. Lenses whose focal length is longer than the diagonal of the largest plate they are listed to cover are known as narrow-angle lenses. Those of which the focal length is about equal to the base-line of the plate are known as medium-angle lenses. A wide-angle lens has a focal length less than the base of the plate it is intended to cover.

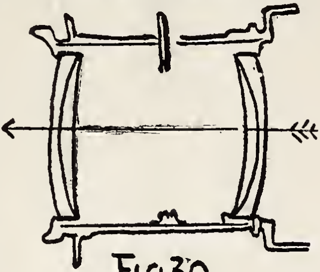


Fig 30

**“Wide-Angle” Lenses.** Wide-angle lenses form a class in themselves, including all objectives embracing an angle of view greater than 75°. Steinheil's *Periskop*, combining two simple, uncorrected lenses of crown glass, was one of the earliest of wide-angle lenses. It included a very wide angle of view, but had to be used with small diaphragms, which necessarily made it slow. Ross, Dallmeyer, and others have improved upon this early form by changes of curvature, combinations of different glasses, etc., until we have in the anastigmats of Zeiss, Goerz, and Voigtlaender wide-angle lenses with available apertures of *f*/11, *f*/12.5, etc., covering an angle of 75° and over, without distortion and free from astigmatic aberrations.

**Jena Glass.** In 1885 opticians realized that a new kind of optical glass would have to be created before further advances could be had in the making of photographic lenses. Drs. Abbe and Schott, of Jena, therefore set out to determine the effect of various metals and their salts, when mixed with glass fluxes, on the relative refractive and dispersive values of such fluxes. It was found, after years of experiment, that barium and its salts, especially barium silicate, would produce the effect desired. Briefly put, the advance accomplished in the new kinds of Jena glass introduced by Abbe and Schott, in 1885, consisted in the production of a large number of varieties of glass possessing high refractive indexes combined with low dispersive indexes, and vice versa. With these new glasses lens-makers have been able to solve many problems hitherto impossible of solution and to produce lenses of great luminosity (rapidity), with a flat field and greater angular dimensions, giving perfect definition over a larger area than had before been possible. As the practical result of these discoveries we have the "anastigmatic" lenses, which, under various names, closely approach the ideal of a photographic objective. The first to appreciate the possibilities of the new Jena glass in a practical way was an American optician, R. D. Gray, who, in 1887, constructed his *Extreme-Angle Periscope*, embodying several of the features made possible by the new glass.

**Anastigmats.**

In 1890 Dr. Rudolph, of Jena, brought forward the Zeiss anastigmats, being followed a year later by Messrs. Hoegh and Goerz with the *Double Anastigmat*, a symmetrical combination with an aperture of *f*/7.7, which includes an angle of 75°, free from astigmatism, and with a flat field. These were followed by Dallmeyer's *Stigmatic*, Voigtlaender's *Collinear*, the Cooke lens, and others, all of which have points of similarity, but differing in construction, although all striving to attain the same end. Descriptions of these anastigmats may be found in the catalogues of their makers and, as a general thing, it may be said that the lenses fairly fulfil the claims therein made for them. Their advantage over the older forms of lenses, as has already been explained at various points, consists in their greater intensity (rapidity); extreme fineness of definition over an extended area of illumination; portability, and freedom from the defects of earlier lenses, especially astigmatism, in the correction of which lies their special superiority. It is not possible here to advise as to a choice between this and that anastigmat. Experience proves that they closely approach each other in performance when tested with the intelligent care which their comparison demands. Choice, therefore, must be left to actual tests of several varieties and the judging of their results *on the plate*, in which personal tastes will undoubtedly differ.

There are, of course, differences in construction and performance among the anastigmatic lenses in the market, a knowledge of which cannot but prove useful to the photographer. A few notes about these differences are therefore given as a sort of "first aid" to the worker in the choice of an anastigmat for his special needs. It is hardly necessary to add, however, that no superiority of merit is implied in the arrangement of the notes.

**Zeiss Anastigmats.** The Zeiss anastigmats are included in nine series, which most comprehensively cover the needs of modern photography. Of these, Series Ia., II., IIa., and III. will be found especially suited for work with the hand-camera, while Series IV. and V. offer advantages for photography indoors, or in confined situations, where a wide-angle lens is essential. Series VII. consists of a medium-angle single anastigmat with a speed of *f*/12.5 which, apart from its usefulness as a single lens of great rapidity and highly corrected powers, forms a basis for Series VII$^a$, in which two lenses of Series VII., of the same or different focal length, may be united in an adaptable tube, making a doublet working at *f*/6.3, *f*/7.7, etc., according to its focal length. Series III. works at *f*/7.2, embracing an angle of 50° on the plate which it is listed to cover. It is simpler in construction and not quite equal in its correction to Series II. or IIa., offering, therefore, the advantage of being less in price. Series II. and IIa. work at *f*/6.3 and *f*/8 respectively, including an angle of from 46° to 60°. It should be noted that all the Zeiss anastigmats embrace a greater angle than that given for the plates they are listed to cover; they may, therefore, be used as medium wide-angle lenses on larger plates than those for which they are listed. Series II. is one of the most rapid of the anastigmats thus far available, and is, on this account, peculiarly useful for instantaneous work on cloudy or gray days as well as for studio photography when the light is poor. Series IIa. has a shorter focus and slightly greater angle than Series II., which, combined with the aperture *f*/8, gives greater depth of definition. It is, therefore, a useful lens for hand-camera work and general purposes ranging from large heads in the studio to process reproduction. Series Ia., known as the Planar Series, is the latest of the Zeiss anastigmats and reaches the extreme limit of rapidity (*f*/3.6) thus far attained, including an angle of 50° on the size of plate which it is listed to cover. It is remarkable for its power of definition, while in rapidity it equals the rapid portrait-lens. With these advantages the adaptation of the Planar to the photography of objects in motion (for "animated pictures"), for portraits and groups, photo-micrographic and process reproduction-work, will be readily apparent.

**Goerz Double Anastigmat.** Quickly following the introduction of the Zeiss non-symmetrical anastigmat, as we have seen, came the double anastigmat of Goerz. This is a symmetrical doublet in which the two elements are separately and equally corrected for chromatic, spherical, and astigmatic aberrations. Either of its halves may, therefore, be used as a single lens of about double the focal length of the complete system. The Goerz lens is noteworthy as the first lens in which the new Jena glasses were used, which combined in symmetrical form all the lens qualities for years regarded as ideal—*viz.*, freedom from astigmatism, flatness of field, and great covering power with a large aperture (*f*/7.7). The field included by the lens embraces 72°, within which angle curvature is entirely eliminated. An advantage of the double anastigmat worthy of mention is the fact that it gives a sharply defined image to the edges of the circle of illumination. Hence it may be used as a medium-wide angle lens for instantaneous work with equal definition and illumination over the whole of the image. This feature makes apparent its adaptability for hand-camera work. It is made in two series, III. and IV. The first is listed for portraiture, instantaneous photography, landscapes, architecture, interiors and enlargements ; Series IV. is a rapid copying-lens of greater angle than Series III., working at *f*/11, and covers a plate the diameter of which is double the focal length of the lens without distortion. The angle included extends from 75° to 90°, according to the diaphragm and plate used. Four sizes of Series III. are constructed with special mountings for use with hand-cameras, in which connection the Goerz lens has an enviable and well-deserved reputation.

**The Concentric Lens.** The concentric lens was introduced in 1892 by the firm of Ross Ltd., and is a symmetrical doublet, free from astigmatism, with considerable covering power and flatness of field. The name concentric was given to this objective because the radii of the back and front surfaces of each element are struck from the same centre. In its construction the concentric embodies characteristics of the wide-angle lens which necessitate the use of smaller apertures than are employed with other anastigmats, the largest aperture giving absolutely sharp definition being *f*/20. When the larger apertures are used, however, the concentric gives beautifully soft images, and it seems probable that, when the prevailing craze for extreme definition shall have passed, this objective will receive the wider appreciation which it merits.

**Collinear Lenses.** The collinear lens, made by the firm of Voigtlaender, is another anastigmat which has claimed much attention of late. It is a symmetrical doublet, each element being composed of three glasses cemented together. It is made in three series: No. II., "extra rapid," with a speed of *f*/5.6 for the smaller sizes, to *f*/6.3 in the larger sizes, peculiarly adapted for the hand-camera and studio work; Series III., "rapid," working at *f*/7.7, with an angle of 80° to 85°. The rear combination may be used as a long focus lens at *f*/16. Series IV. is a "wide-angle" lens, useful also for copying and reproduction work because of its microscopic definition obtained with the largest aperture, *f*/11.3.

**Dallmeyer's Stigmatic.** The stigmatic, made by Dallmeyer, is one of the latest objectives of the anastigmatic type, and as a lens of general utility has many points in its favor. It is made at present in two series only. Series I. is a portrait-lens, working at *f*/4. Series II. is named a "universal" lens, with an available aperture of *f*/6, which places it among the modern lenses of extreme rapidity. Like others of its class, the stigmatic has great covering power, freedom from astigmatism, and a flat field. It has also the advantage that it combines in one objective four different lenses of varying focal length, which gives it a field of usefulness including portraiture, landscape, and wide-angle work. The smaller sizes are suited for hand-camera work, as the lens covers the plate with sharp definition to the edges, even when used at full aperture—*viz.*, *f*/6. When a smaller aperture is used, *f*/16, the lens will cover a plate two sizes larger than that for which it is listed. When the front element is used alone as a single lens, it has a focal length 1½ times that of the entire lens, and the back element has a focus twice as great as the doublet. The variety of effects obtainable with such an instrument will be readily perceived. The stigmatic is also useful for group-work in studios of limited length.

**The Cooke Lens.** The Cooke lens, made by Taylor, Taylor & Hobson, is notable as an anastigmat for the simplicity of its construction, and the small number of glasses (three) of which it is composed. It gives absolutely sharp definition over the whole of the image with the full aperture, *f*/6.5, with freedom from astigmatism and distortion combined with great brilliancy. Series III. is fitted with a screw adjustment by which the glasses composing the lens may be adjusted to the requirements of photography as applied in three-color process-work.

**Turner-Reich Anastigmat.** The Turner-Reich anastigmat is the only purely American lens of this type. It is fully corrected for astigmatism with a flat field, and works at *f*/7.5. With smaller apertures a larger plate may be covered without the loss of definition. In construction this objective is symmetrical, and hence either combination may be used as a single lens embodying rapidity and brilliancy.

**Gray's Ex.-Angle Periscope.** Among anastigmats of the "wide-angle" variety, mention should be made of Gray's extreme-angle periscope, which, introduced in 1887, was the first lens to embody the advantages of the new Jena glass. The extreme-angle periscope, in the smaller sizes, covers the plate at *f*/10 and embraces an angle (on the axis of the plate) of 100°, with equality of illumination all over the image. This objective is a symmetrical doublet, free from astigmatism and perfectly rectilinear. Each element is individually achromatized and so may be used separately as a landscape lens. Extension tubes, furnished with the lens, may be employed to form a rectilinear with a flat field, including an angle of 60°. This is sufficiently rapid for instantaneous work under favorable conditions. The Zeiss anastigmat, Series IV., *f*/11.5, and the Goerz double anastigmat, Series IV., *f*/11, also come under this class.

**Tele-Photo Lenses.** A tele-photo lens, or, more correctly, a tele-photo attachment, is simply a brass tube with an achromatic negative-lens system at its rear end, the front end being threaded to receive an ordinary photographic lens. The purpose of the tele-photo objective thus obtained is to secure larger images of distant objects than can be had with a lens of medium focal length fitted to a camera with the ordinary capacity of bellows extension. This objective, therefore, gives with the usual camera of short extension as large an image as could otherwise only be secured by means of a long-focus lens and camera capable of considerable extension. In practice the image caught by the photographic lens is transmitted to the negative (magnifying) lens, and by it enlarged from three to five diameters, according to the capacity and adjustment of the system employed. The first tele-photo lens was, we believe, made by Dallmeyer at the suggestion of Dr. P. H. Emerson in 1892–93. Since that time various forms have been introduced by Steinheil, Voigtlaender, Zeiss, the Bausch & Lomb Optical Co., and others.

We have now completed a preliminary survey of the progress of photographic optics as far as it bears upon modern lenses. Fully sensible of its incompleteness, the writer would urge those interested to follow up this introduction to the subject by a course of reading and experimental work which, the reader is assured, will prove itself to be a most fascinating form of recreation, supplying profitable information and pleasure at every turn. A few of the books on the subject at present obtainable are listed below:

## BOOKS.

*The Optics of Photography and Photographic Lenses.* By J. Traill Taylor. 1892. 244 pp., many diagrams. $1.75.

*Lens Work for Amateurs.* By Henry Orford. 1894. 260 pp. Illustrated. $1.50.

*The Optics of Photography.* By W. K. Burton. 1891. 110 pp., with diagrams. $1.50.

*Photographic Lenses: How to Choose and Use.* By John A. Hodges. 1895. 220 pp. Illustrated. $1.00.

*A Simple Guide to the Choice and Use of Photographic Lenses.* By J. H. Dallmeyer. 1898. Illustrated. Pamphlet. 50 cents.

*Photographic Optics.* By R. S. Cole. 1899. 325 pp. Illustrated. $2.50.

*The Tele-Photographic Lens.* By J. H. Dallmeyer. 1883. Diagrams. Pamphlet. 50 cents.

*Early Work in Photography.* By W. Ethelbert Henry. 1897. (Contains a valuable chapter, "Facts about Lenses," by H. Snowden Ward.) Diagrams. Paper. 50 cents.

*Photographic Optics.* By D. Van Monckhoven. (1867. Now out of print, but obtainable through second-hand booksellers.) This is perhaps the most valuable work on the subject for English readers, although necessarily treating only of early objectives. Profusely illustrated. Should be obtainable at about $2.50.

In addition to the foregoing, the catalogues issued by Zeiss, Messrs. Ross Ltd., Dallmeyer Ltd., the Bausch & Lomb Optical Co., Messrs. Taylor, Taylor & Hobson, C. P. Goerz, and the Voigtlaender & Son Optical Co. have much interesting information which should not be overlooked. These catalogues can be had free on application to the manufacturers named.

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# NOTES

THE PHOTO-MINIATURE is not a chance production. The leading idea of a monthly digest has been decided on after many years of work in touch with the photographers of the entire English-speaking world. There is no lack of photographic journalism, but the very wealth of output scatters knowledge to such an extent that it is impossible to completely trace any desired subject; a difficulty only fully appreciated, perhaps, by those whose work places them as the recipients of the inquiries of baffled seekers.

◆

The digest will provide just that range and extent of information which is essential to every photographer. Many who neither wish nor require the specialized knowledge of an expert, desire at least a sound general understanding of the many sections of photographic work; and this has only been obtainable hitherto by a somewhat laborious and expensive perusal of text-books of varying degrees of usefulness.

The notes which we publish month by month will be carefully selected with a view to their usefulness and interest. A feature of present-day photography is the great movement by which photographers are coming together to exchange ideas, the professionals through their conventions, and amateurs and professionals alike through their clubs and exhibitions. It is but a few short years ago since three leading societies combined to hold an annual exhibition, and found the task onerous. Now, exhibitions are a matter of course, and in several States salons have been held where much work of the first quality has been shown. The number of workers has increased to an extent undreamed of a few years ago, when the "photographic craze" was deemed

# THE GOERZ

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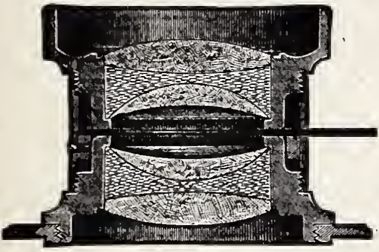

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at its height, and a reaction feared. And even more than the number of workers has the quality of their work increased. It is now seldom that we see in public such utterly bad work as was occasionally seen at some of our earlier exhibitions.

◆

"Labor-saving" appliances for photographers are common and ever-increasing. New apparatus and new developers are of almost daily frequency, and where reference to these is of general interest they will be briefly but adequately described. New formulæ — when not readily accessible — will be given, and such trade news as is helpful. News of foreign workers—not rehash or space-filling—will be included, and the many bits of information incident to photography.

◆

We wish for the co-operation of every reader of "The Photo-Miniature" and offer full reciprocation. Our first announcements have brought us many offers of practical support, for which we thank our friends. There are many ways in which our friends may help besides keeping us informed of news items. Two of these ways we mention. If every reader will refer his friends to "The Photo-Miniature," and if he will always mention the magazine when replying to the advertisements in its pages, we on our part will be enabled to reciprocate by enlarging the magazine and the scope of its special features.

In another paragraph we very briefly speak of the illustrations given in this issue. Our illustrations will be chosen with a view to their educational value, rather than a consideration of mere prettiness, or even of difficult technique. They will not necessarily be confined to the works of painters; photographs will be reproduced when thought desirable. John Ruskin has sighed over the prodigal wealth of photography, and confessed

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that a satiety of perfection makes him the more appreciate the beauty of some of the simplest of line sketches. A quiet study of a couple of examples of "old masters" may be more useful than a glance over a thousand of similar works.

❧

Mr. H. Snowden Ward, of London, who is at present in this country, is delivering a lecture which contains much of interest to the photographer. In England photographers are, more or less, awake to the fact that objects of great interest are almost daily being destroyed, and an influential association has been formed to record, with the camera, old landmarks which are passing. Mr. Ward has taken an active part in this work and has specialized on recording the traces of great men. The work is really an associate effort, most of the negatives being taken by Mrs. Catharine Weed Barnes Ward. During the past summer Mr. and Mrs. Ward have followed the footsteps of Dickens, obtaining many records, giving a conception of the environment of Dickens and his characters which is a revelation to many Dickens admirers. We refer to the work especially as suggestive of unworked lines in this country. The value of a plan of work, as distinct from a mere recording of pretty scenes, is self-evident. The literature of New England has as great a wealth of material as the literature of Old England. The life of the land, from Plymouth Rock to the Golden Gate, is ever widening and changing, and records of intense interest may anywhere be obtained. There is an ever-sounding cry of overcrowding and lack of opportunity, but the opportunities cry still more loudly to those who are sufficiently on the alert.

❧

The photographers and process-workers of Australasia are so far removed from the pulse of American

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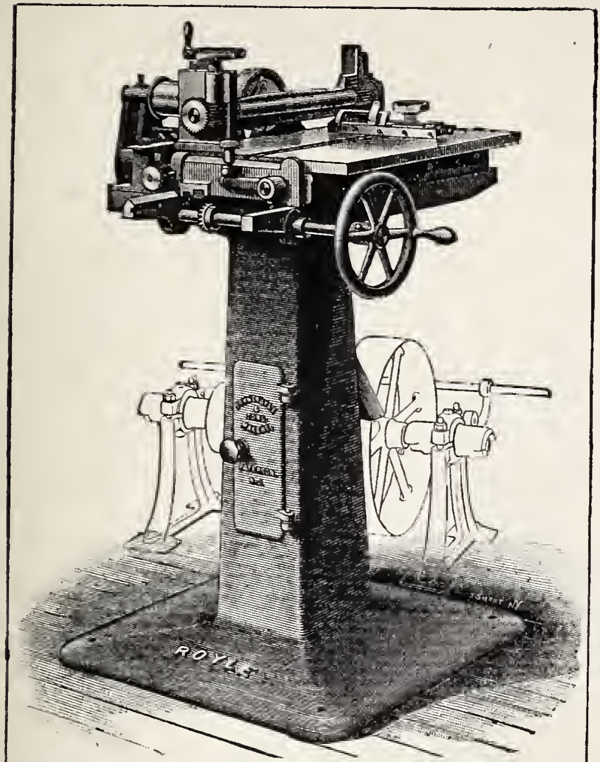
progress that their work has many features indigenous to the soil. Time was, and only a very few years ago, when Australian work bore a distinct stamp of groping inexperience, but the workers have been men of ability, and they have raised their work to a position with the best. We have just received a copy of the Christmas number of the *Christchurch (N. Z.) Weekly Press*, which, like several of its contemporaries, takes more the form of a high-class illustrated than a mere news sheet. It contains a description of a visit to gold-fields in New Zealand, written and illustrated by Walter Burke, a professional photographer whose work has for years been steadily gaining in scope and in ability. His article is illustrated by some sixty half-tones so judiciously selected that in a glance at them one seems to grasp the entire spirit of the land, its works, and inhabitants. Mr. Burke adopts the American plan of putting full explanatory notes, where needful, under each picture. Throughout the sheet, indeed, the illustrations indicate careful editing, not one of the numerous cuts appearing to be superfluous.

◆

*The Ladies' Home Journal*, which makes extensive use of photographic illustration, does so, not on the score of cheapness—that *bête noire* which has brought forth as many cheap photo-illustrated sheets—but because photography alone can serve its needs. The editors have just commenced a series of illustrations of flower-gardens, a subject impossible without photography. There is a special fitness in this use of the art by the leading ladies' paper, for women have taken a strong place of their own in photography. Not only have they been successful as amateurs, but many of them have taken to the camera as a means of livelihood; and in some of their studios sound business methods are united with unusual ability, resulting in financial success.



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*The American Journal of Photography*—an old-time paper which recently ceased issue—has been resuscitated under the editorship of John Bartlett. Mr. Bartlett stamps his individuality on the first issue, and may be counted on to do his share in firmly refounding the magazine. His name is surety for sound work.

◆

A Texan correspondent writes us suggesting that there is a big field for any firm who will loan blocks at a low rate to photographers, to be used for advertisement circulars. He thinks that the price of blocks is altogether too much to admit of their use for pushing business. Many men, keen in business on some lines, regard advertising as a necessary evil. Some firms do not need to advertise, but where advertising is followed, it should be as thoroughly handled as any detail of business. Advertising should not necessarily be high class—some live firms scatter announcements by the million, by the cheapest of methods. But to make a thing cheap, simply to effect a saving of first cost, is a policy as blind as it is ruinous.

◆

Advertising is often spoken of as an art. Certainly it is a field which engages some of the brightest intellects. The Eastman Kodak Co. has spent fortunes in teaching the world a new word and a new proverb, and the fame of Velox has cost solid money. In each case the firms had good articles, and articles that people were wanting, but had they relied on the merits of their goods for their introduction, or had they treated advertising as an evil to be curtailed, their names would be unknown to-day.

The Bausch & Lomb Optical Co. has issued what it rightly terms an "Art Catalogue," a gem of work which could have been produced cheaply—and therefore spoiled—at a great saving of first cost. But the thing was done very thoroughly and the catalogue is one which will be kept. Dr. J. C. Millen's printed matter,

## MAGIC LANTERNS AND MAGIC LANTERN SLIDES

Are articles not to be purchased at random or from irresponsible dealers, the quality of these goods varying in the same way as a photographic lens. Good articles command a fair price, and we keep nothing but the best. In buying look out for our trade mark as illustrated here, and remember we guarantee everything we sell, and if not satisfactory take it back or replace it.

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|---|---|---|---|---|
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are all marvels of cheapness. We have lanterns also up to $800.00. Slides on every conceivable subject at 35 cents each, plain, and 85 cents each, colored. Slides on the War, Cuba, Porto Rico, and the finest set on the Philippines extant. Sole Agents for slides from Mr. J. C. Hemment's negatives of the war.

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Catalogue, 20 cents. Hire and War Lists free

to the very smallest of circulars, displays a restrained art-culture which stamps it as unique. In the technical details of printing and paper he chooses the best, and his little "French Satin Jr." booklet is a treat to a lover of book-making.

❧

To the man whose trade is purely local the necessity of "brains" in his advertising is as essential as to the man whose goods are known throughout the world. Too often the advertisement of a man doing a limited amount of business is of the "enlargements gratis with every dozen" kind. Some time ago the advent of new blood to a small city caused the usual rate fight. While three unfortunates were clamoring for sitters at ruinous prices, the fourth calmly *raised* his, and by emphasizing quality and high rates, "scooped" the best trade in the city—a good instance that advertising *may* sometimes be done without spending money, if the brains are there.

❧

The mapping of the heavens is a subject which appeals to the minds of many who cannot grasp the photographic triumphs involved in such a work. Statements occasionally ooze through the lay press with wondrous figures to tell the number of recorded stars. It is less than sixty years ago since the first beginnings of astronomical photography. And the first photograph —a daguerreotype of the moon—was made in New York, by Dr. Draper.

❧

The action of some hundreds of English architects in petitioning the London County Council to restrict the use of illuminated advertisements is a curious instance of the many-sidedness of artistic feeling. London has spoken against sky-scrapers, and for years she has been pulling down those huge swinging sky-signs which were the predecessors of the electric letters. Certainly the idea of a towering structure eclipsing the pre-eminence

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of St. Paul's Cathedral is as startling as it is displeasing, but to analyze the reasons for such a conclusion would be a difficult and lengthy task. The great glory of the Thames is the night sweep of its embankment lights, with the gleams of lanterns from tugs and barges—a glory altogether foreign to the age of watermen and sedan chairs. What is anathema in London is the wonder of New York. The expression of a new world is stamped on her ragged, ever-changing sky-line, and the blaze of light as seen when crossing on an evening ferry from the New Jersey shore—or the flaming welcome of Liberty to an incoming boat—thrills the American as the medieval treasures of Europe thrill those of the home countries. Captain Abney once asserted that some of the productions of the photographers who have arisen since the days when albumen paper and pyro reigned supreme gave him actual and physical nausea, an extreme case worthy of place with the cat terrors of Shakespeare and tradition.

❧

We are too prone to associate "art" with all that is impracticable, and to divorce it from the swirl of everyday actuality. The mind that can see the beauty of the canvas-spread of an old-time sailing-ship could be trained to see the beauty in the grimiest of coasting colliers, and we are now beginning to see the art possibilities in latter-day engineering. Turner painted a great picture of a railroad engine, its fire gleaming luridly through the wreaths of mist and storm, a picture as wonderful as any of his glories of the ancient world. Dumas's musketeers flash through France, consorting with kings and cardinals, and intriguing for the overthrow of empires, but greater than they are Kipling's three red-coated soldiers of the line, who, steeped in beer and tobacco and "devilment," serve the "Widder" under the scorching sun of India.

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Vol. I. No. 2. May 1899

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| **ELEMENTS OF A PICTORIAL PHOTOGRAPH.** By H. P. Robinson. (1896.) 37 pictures in the text, and frontispiece "Storm Clearing Off." Chapters on: Imitation—The Study of Nature—The Use of Nature—Some Points of a Picture—Selection and Suppression—Composition—Expression in Landscape—Idealism, Realism and Impressionism—Limitations. The Nude—False Purity—The Question of Focus—Models—Foregrounds—The Sky—The Sea—Rural Subjects—Lessons from Birket Foster—Winter Photography—Individuality. Postpaid.......... | $1.75 |
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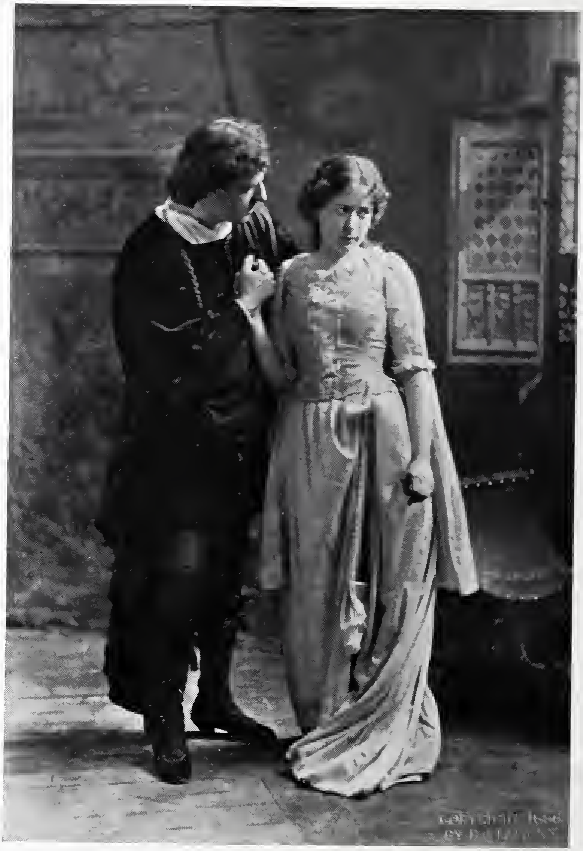

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THE PHOTO-MINIATURE

*A Magazine of Photographic Information*

Edited by John A. Tennant

Vol. I MAY, 1899 No. 2

# THE POSE IN PORTRAITURE.

A word of explanation seems desirable before the reader sets out upon what may prove to be a somewhat tedious journey. There are some things in life the actual doing of which is much easier than to describe the manner of their doing, and the pose is one of these things. If we could have a wet afternoon, a few models, and a suitably lighted room at our disposal, it would not be so difficult to explain the few elementary principles which govern the pose in portraiture. And it might then be done in such a way as to be interesting, even to those who believe that any attempt to pose the subject is the worst sort of folly. But to set forth in unfeeling type things which, after all, are to be felt rather than expressed, is quite another story. There are those, indeed, who claim that skill in posing is a gift, an intuition, a matter of inherent good taste, and can neither be taught nor acquired. When we know a little about the pose, however, the fallacy of this claim will be apparent, and we will see that posing is simply a method of expression like speaking or writing, and that it may be acquired and cultivated, as style in writing is, by familiarity with certain forms and their significance and relation to each other. Furthermore, though what is written herein is intended to help all who read it, my chief aim is to be useful to those who, at present, know little or nothing about the pose, or the part it plays in the making of a portrait. To overcome these difficulties, which can be appreciated only by those who have encountered them, I propose to deal with my subject as though the reader were wholly ignorant in the matter ; so that, although the work may lack in completeness, it will at least be readily understood as far as it goes, and serve as a stepping-stone to better things.

**Essentials in a Portrait.** The first essential in a portrait is fidelity of likeness to the original. For this reason portraits are sometimes called "human documents"—*i.e.*, faithful witnesses of the personality portrayed. Lacking likeness, a portrait fails to fulfil its end, loses its chief interest, and is unworthy of its name. Unfortunately, it is not as generally understood as might be, even among professional portraitists, that the pose has a very intimate relation to likeness—that it is possible, for instance, to make a satisfactory likeness of a person by characterization in attitude without showing the face. We have demonstration of this in silhouettes where the face is not seen in profile. Such portraits are, of course, incomplete, suggestive; but they reveal the characteristics of their originals, and clearly prove that the pose plays a definite part in the expression of character.

Among several portraits of a friend, all equally faithful in likeness, there is generally one to which we give the preference. If we inquire as to the reasons for this preference, we will find that there is something—often an indefinable something—in the arrangement of the figure that reveals or emphasizes the most desirable characteristics of the subject, or adds grace or interest to the picture and so gives us pleasure. Or it may be that the scheme of light and shade running through the portrait enhances the personal charm of the subject, and so makes it especially desirable. Now these three qualities—likeness, a pleasing and characteristic arrangement of the figure within the picture space, and a scheme of lighting which gives harmonious expression to what the face and pose tell us of the character of the sitter—are the vital elements of all portraiture.

**The Pose.** The arrangement of the figure in a portrait constitutes the pose; and the art of arranging the subject, and its accessories, in a characteristic and pleasing way is known as composition. The purpose of this little book is to explain, as simply as possible, composition as applied in the making of a portrait. This I will endeavor to do, not by giving a multiplicity of rules to be followed, but by indicating what effects are to be sought as desirable, what avoided as evil, and how a pleasing arrangement may be secured by the management of the lines and masses formed by the figure within the confines of the picture space. The elementary principles of pictorial composition will be touched upon very lightly as their help is necessary. And I hope to make it clear that, with a knowledge of these few elementary principles of composition, posing is as simple as it is interesting, instead of a laborious striving after impossible ideals, as it is commonly supposed to be.

**Why Pose at All?**

First, let us answer the question: Why is it necessary to pose at all? The simplest answer to this is: Because the figure must fit a space. Now the shapes of all bodies acquire greater significance when they are bounded or inclosed within lines, and this significance changes according to the shape or proportions of the form made by the bounding lines, and also according to the space between the outlines of the object and the lines inclosing it. For this reason, alone, when we attempt to represent a figure within a space bound by shape or proportion, composition or arrangement of some sort is necessary if the result is to be pleasing to the eye.

**Significance in Lines.**

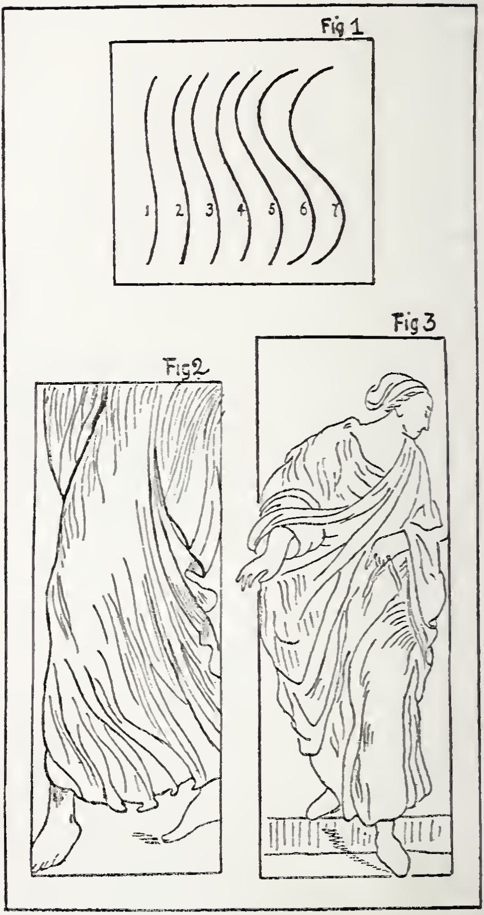
If we recall the shapes of objects in nature we will find that some give us more pleasure than others, and that different forms awaken different sensations in the mind. Thus the perpendicular line gives a sense of stability and support; lines inclined at angles seem to speak of action; horizontal lines express repose and so forth. We know that the curved line gives a greater degree of pleasure than an angular or straight line; that the circle and oval are more interesting than the outlines of a square. This quality possessed by lines to interest or give pleasure is elegance, grace or beauty—which is generally defined as *variety in unity.* You remember Shakespeare's summing up of the beauty of Cleopatra—"Nor custom stale her infinite variety." Sully says: "Beauty is that which affords us the greatest number of ideas in the shortest time." This tells us why the curved line, such as the oval, is more interesting and gives more pleasure than rectangular forms or straight lines in any combination; *i.e.*, it awakens a greater variety of ideas in the mind or imagination. An appreciation of this quality of lines or figures to awaken interest and give pleasure is of more importance than anything else to those who would attain skill in the pose of the human figure. If we can thoroughly familiarize ourselves with those lines and forms which most express elegance and grace, we will all the more easily secure the interest of grace for our work by causing the lines of the figure to approximate recognized forms of beauty. Some people have attained this capacity unconsciously by observation and practice, and it is among these that we find those who discourage any attempt to pose the subject. When, however, they say: "We do not pose," or "The best way to pose is not to pose at all," they really mean that, having arrived at such an understanding of characterization and grace that deliberate effort to secure these things by arrangement is not necessary, they fail to appreciate the lack of this capacity in others. Since, then, this appreciation of grace in line is so essential in composition, I venture to give here a few notes from Hogarth's *Analysis of Beauty*, a somewhat rare work which portraitists will do well to read whenever fortune places the opportunity in their way.

**The Line of Beauty.** In this *Analysis* Hogarth speaks of the ancient Greeks possessing a key to all harmonious proportions of form in painting, sculpture, architecture, etc., to which they owed their pre-eminence over all other nations in the arts. This key, or analogy, was said to have been brought to Greece by Pythagoras from his tour in Phœnicia, B.C. 520. What this analogy was does not seem to have been disclosed save in ambiguous phrases, as "an infinite variety of parts," etc., and Hogarth quotes Lamozzo as saying: "The Greeks, in imitation of antiquity, searched out the truly renowned proportion, wherein the exact perfection of the most exquisite beauty is found, and dedicated the same in a triangular glass to Venus—the goddess of Beauty." Further on Lamozzo is again quoted as saying that: "Michael Angelo gave this observation to the painter Marcus de Sciena, his pupil, that he should always make a figure pyramidal and serpent-like. In which precept the whole mystery of art consists. For the greatest grace that a picture can have is that it express life and motion. Now there is no form so fit to express motion as that of a flame of fire ........ for the form of a flame is most apt for motion ........ wherefore a picture having this form will be most beautiful." Du Fresnoy, in his *Art of Painting*, says: "A fine figure ought always to have a serpentine and flame-like form;" Rubens made use of a large flowing line;

Raphael used the serpentine line almost to excess; and Correggio also well understood its possibilities. "The serpentine line," says Hogarth, "by its waving and winding in different ways at the same time, leads the eye in a pleasing manner along the continuity of its variety, ....... which line, with the triangle, gives the most expressive of figures, signifying not only beauty and grace, but the whole order of form." This line, commonly known as the "line of beauty," is seen in its various forms in Fig. 1, that numbered 4 being said to be the most precise. Hogarth's opinions excited considerable discussion when published (1753), and have since been pronounced to be erroneous. I give them place here as likely to be of service to others, as they have been in my own practice. That the predominance of this "line of grace" does convey a sense of elegance wherever it is found may be ascertained by observation in nature and art (See Figs. 2 and 3). Whatever helps us to appreciate beauty will aid us in its expression, and by a knowledge of the significance of lines we perceive the reasonableness of the pose, as the photographer's equivalent for composition. For, as we have seen, the use of composition is simply to express the characteristics of the sitter in an interesting and pleasing manner and to subordinate what is superfluous.

**Old Masters vs. Modern Methods.**

Since the revival of interest in portraiture a few years ago, much has been said about the necessity of studying the "old masters" and their methods of treatment as applied in portraiture. This counsel is undoubtedly sound; the photographer may find in the portraits by the "old masters" many profitable lessons and suggestions. I would like to protest, however, against the tendency to *imitate* the peculiar "handling" and effects of these early models too closely, such as the use of draperies to cover the modern dress, "Reynolds" and "Gainsborough" backgrounds, excessive use of dark, heavy grounds and mediæval furnishings, so that the picture looks as if it had come down from the days of our forefathers. This is a mistaken notion. The intelligent worker will always appreciate at its real value the heritage he possesses in the works by past masters in his art. We must beware, however, of a too-zealous following of ideals or methods belonging to times remote from our own. It is true that beauty is unchangeable, and re-



mains forever the same in its infinite variety; but its interpretation varies with the temperament of the age and of the individual. We must be ourselves, not echoes of dead men, however great. We should strive, therefore, to appreciate and express what is characteristic and graceful in the men and women of our own day, rather than effects and styles belonging to an earlier time. The works of modern painters such as Boughton, Sargent, Collier, Carolus Duran, Sharp, Chase, Ouless, Fildes, Alexander, etc., will be helpful in this direction, but the great inspiration must be sought in the life about us in the streets and at home.

**Personality.** The supreme interest in a portrait is likeness, the portrayal of personality. Our first care, therefore, must be to make sure that the attitude or disposition of the figure shall accentuate or harmonize with the character revealed in the face of the subject. The photographer labors under great disadvantage in this; he usually sees his subject for the first time at the actual time of sitting, and there is little opportunity to study what is characteristic. With the amateur things are different; his subjects are generally people with whose life and manners he is already familiar by association. Where these are not known, it is well worth while to delay the sitting a few moments, and by conversation or other means to cause the subject to forget the work of the moment and unconsciously express those little details of manner or attitude which "make the man." It is evident from this that the pose must be dictated by the nature of the subject, and herein we get our first glimpse of those principles which, to my mind, are of the greatest importance to the portraitist: simplicity, concentration of interest, and subordination.

**Simplicity, Concentration, Subordination.** The bane of photography as a method of expression is that it tells too much, and gives equal prominence to things important and unimportant. The failure of the professional photographer, who devotes all his time and energies to portraiture, to appreciate this fact is one of the unaccountable things in life. Every effort should be made to preserve simplicity in the portrait, so that the interest concentrates on the personality of the sitter, and all else is subordinated. The centre of expression is largely found in the face, but the hands, the manner or attitude of the figure, all play their part in revealing character. We can recognize a friend by his manner long before we see his face, and we are all familiar with the way in which the hand tells us of character and mind. But if these are to tell their story in a picture, we must give them their proper place and prominence. Do not crowd the picture space with details—we do not see people under a search-light, although the average portrait would give that impression with its map-like definition, its lack of breadth and unity. The eye focuses on one thing at a time, and all other things are seen in a more or less impressionistic manner. This must not be taken to mean that, except the face, the portrait should be out of focus, but that there can only be one centre of interest, and that all the lines should lead the eye, pleasantly and without effort, to that point. Whatever else must be included which does not help us to appreciate the chief interest, such as details of dress, ornament, accessories and the like, should be subordinated in force of line, in tone and light. Only as much detail should be permitted as is necessary to support the composition and connect its parts by a pleasing variety. It is true that we cannot always control those things which may make simplicity of design or effect impossible, but we can avoid a pose which gives prominence to what is undesirable, the emphasis of one feature to the detriment of another ; or the introduction of ornate accessories which by their force of line or tone are bound to interfere with the lines of the figure. As far as my observation goes, this is the greatest fault in professional and amateur portraiture alike, and may be easily avoided by an appreciation of how much simplicity helps to prevent confusion of interest. The simplest poses are always the best. A forcible illustration of the principle of simplicity may be secured by tracing, with pen and ink, over all the lines expressed with equal prominence in a portrait. Abundant material for this exercise may be had in the half-tones by prominent photographers given in the illustrated magazines. In the majority of instances the result will be a mass of conflicting lines, disagreeable angles, and curves which diverge to the margins of the picture, confusing the eye and diverting attention from the centre of interest. I know of no better way than this by which even the dullest eye may see at a glance how powerful lines are for good or evil in a portrait, or how many meaningless and hurtful lines are thoughtlessly introduced or emphasized in the average photograph. In Fig. 4 I have traced over

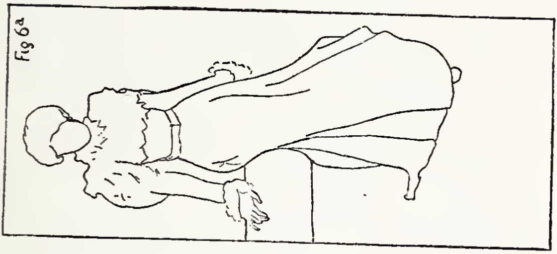


Fig 6a

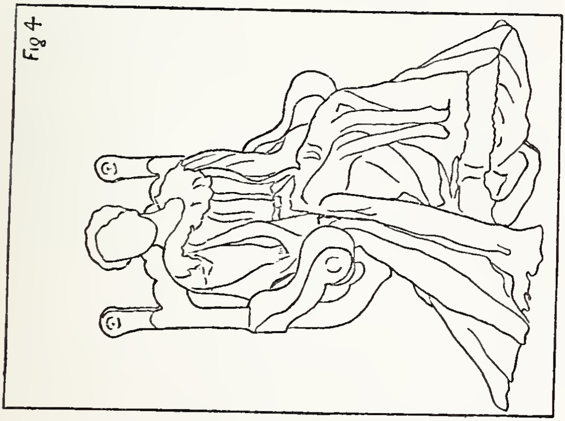


Fig 4

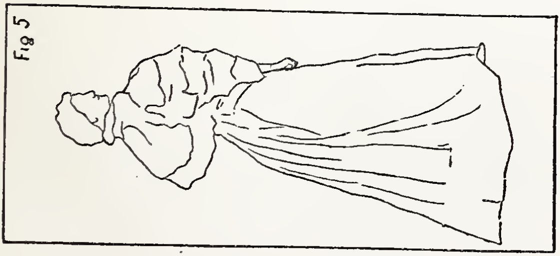


Fig 5

the principal lines of a cabinet portrait which I happen to have at hand as I write. It is not an extreme example, but clearly shows how complexity of line confuses and wearies the eye. In Fig. 5 a pose is suggested for the same subject in which we have grace, simplicity of arrangement, and concentration of interest.

**Variety, Unity.**

Simplicity, however, must not be confounded with monotony. The imagination demands variety, which is one of the chief sources of interest and beauty. Repetition, symmetry and balance or uniformity, when carried to excess, produce sameness and monotony which are fatal to interest. In photographs we have, as a rule, too much variety—or rather, I should say, that disorder which results from conflicting variety. Composition is simply the proper use of variety—the arrangement of variety in unity. This gives us two other principles which we must understand if we are to pose well—variety in unity. By variety we give interest and avoid monotony. By unity we give agreeable connection between the parts of a composition to make of it one harmonious whole. In the desert or plain, for instance, we have uniformity and repetition of lines in excess, and the result is monotony. There are no contrasts to arouse our interests. The sea, on the other hand, is full of fascination because its infinitely varied lines produce an infinite variety in light and shade, and give pleasure by their ever-changing contrasts, by awakening ideas in the mind. Essential, therefore, as variety is in portraiture, its introduction and use must be accompanied with discrimination or the unity of interest will be lost. No amount of variety, however interesting, will compensate for lack of simplicity and repose, which depend on unity—the harmonious agreement of parts in a picture for the expression of an idea. In a composition where several figures are grouped together, a certain variety is sometimes secured by repeating certain attitudes; in a single figure the repetition of lines adds emphasis either in harmony or opposition. Repetition is agreeable until it becomes monotonous, when variety should step in to relieve the eye and carry the

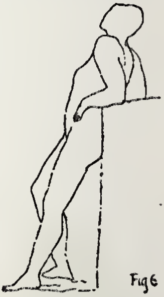


Fig 6

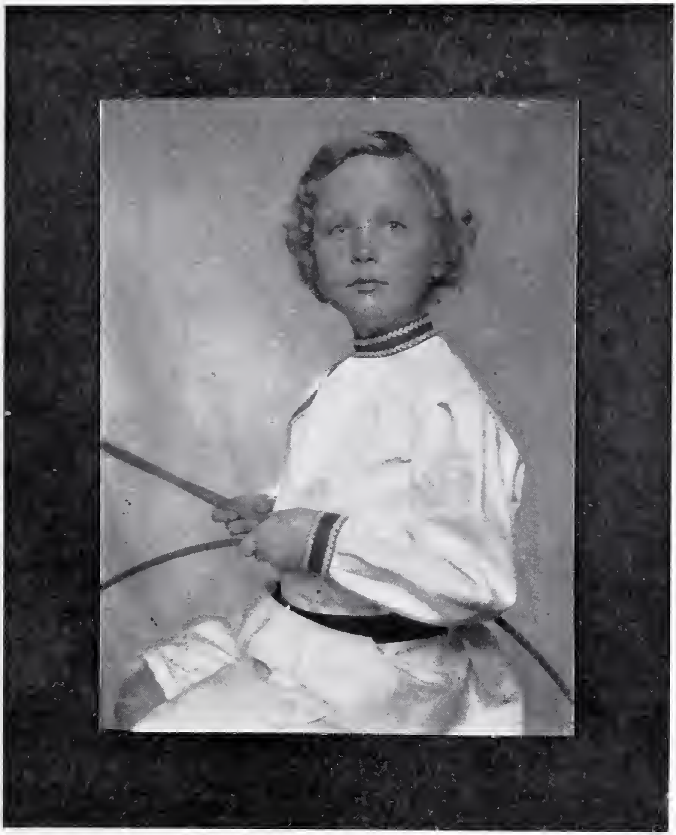
interest forward. And what is here said of repetition is true also of symmetry or uniformity, the too obvious observance of which produces sameness and weariness. This is obviated by variety. The figure of an oval is a perfect example of variety in unity; the figure of a square contrariwise, expressing unity without variety.

**Stability, Support.** Another important principle which applies with equal force in the arrangement of heads, figures showing repose or action, and groups is stability or support. The head must not seem to be falling off the shoulders, or the figure inclining as though it would topple over at any moment, or the figures in a group seem to be suspended in mid-air. Lines running in one direction should be opposed by others supporting or going in the contrary direction. This is largely effected by the use of masses of shadow rather than by lines, but a knowledge of the disposition of lines for this end will be helpful in the arrangement of forms. The simplest expression of stability of form is the triangle, in which also we have symmetry, variety, and grace resulting from the equal convergence of the two sides to a point. This form is one very commonly used in composition applied to the figure. Where it is appropriate to the nature of the subject, as in Miss Ben Yusuf's "Portrait," engraved on another page, it gives a pleasing variety, and at the same time concentrates interest in the face. Sometimes the perpendicular line may be used with advantage to support lines in the figure where they run in the same direction, as may be desired or necessary in the pose. This is seen in Fig. 6, while Fig. *6a* introduces both vertical and horizontal lines to support the natural sweep of the figure.

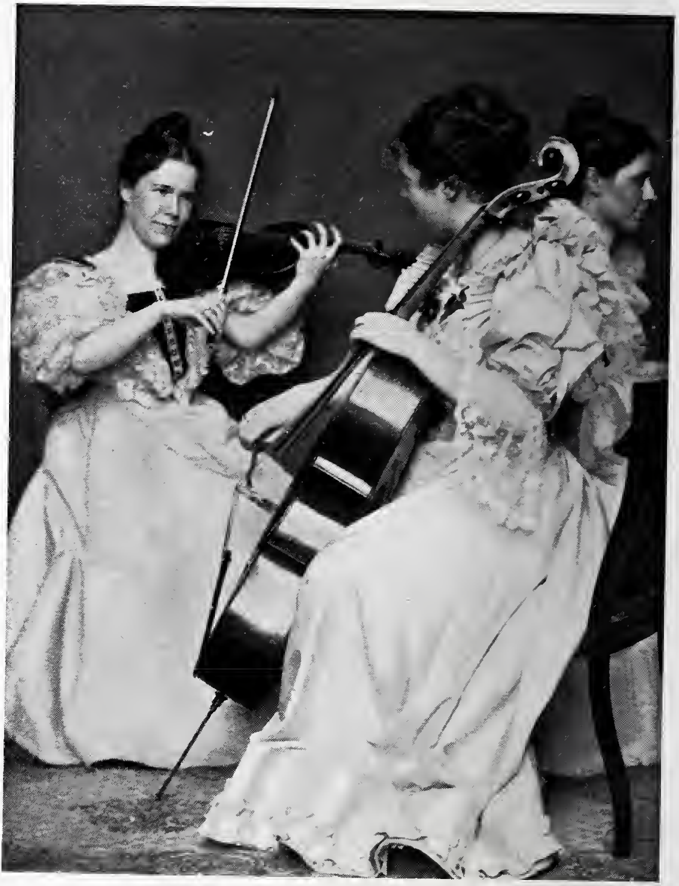
We have now dealt briefly with the principles which influence the pose of the figure. Summing up what has been said, we have seen that as likeness is the chief end in portraiture, the pose should assist in the characterization of the subject, its arrangement being suggested by the individuality of the sitter; that simplicity is the key to success in the pose, concentrating interest by the avoidance of complexity, and emphasizing what is desirable by subordination; that variety is essential to interest but should be used with great discrimination; that the most common fault in the pose "as it is done" is confusion of interest resulting from variety without unity; and that the figure must invariably be supported and convey the idea of stability. We can now intelligently take up the actual composition of the figure and apply these principles.

**Forms of Composition.** Broadly speaking, there are two methods of composition. In the one the figure is made to conform to certain recognized forms of beauty or elegance; in the other the securing of interest is based on the use of a "decorative line." The first method may be studied in the works of masters in painting, old and of to-day, and is undoubtedly the easier method for the beginner. The second is more popular with modern painters who, as a class, have been largely influenced by the spirit of the Japanese school, in which a "decorative line" is the beginning and end of composition. This method certainly gives great freedom for individuality, but its employment presupposes a deeper understanding of design than the average man can acquire. The end of both systems is, of course, identical—to decorate a space; when, therefore, the simpler method has been mastered, the portraitist may, with advantage to his work, take up the "decorative line" and its possibilities, in the application of which he will find abundant use for whatever his earlier work has taught him. Those interested in this method may find its influence in the work of Demachy, Puyo, Appleton, Craig Annan, Von Schöller, Hannon, Miss Weil and others, who excel in the modern treatment of the figure. An example is seen in Fig. 7, which outlines one of Captain Puyo's charming figures.

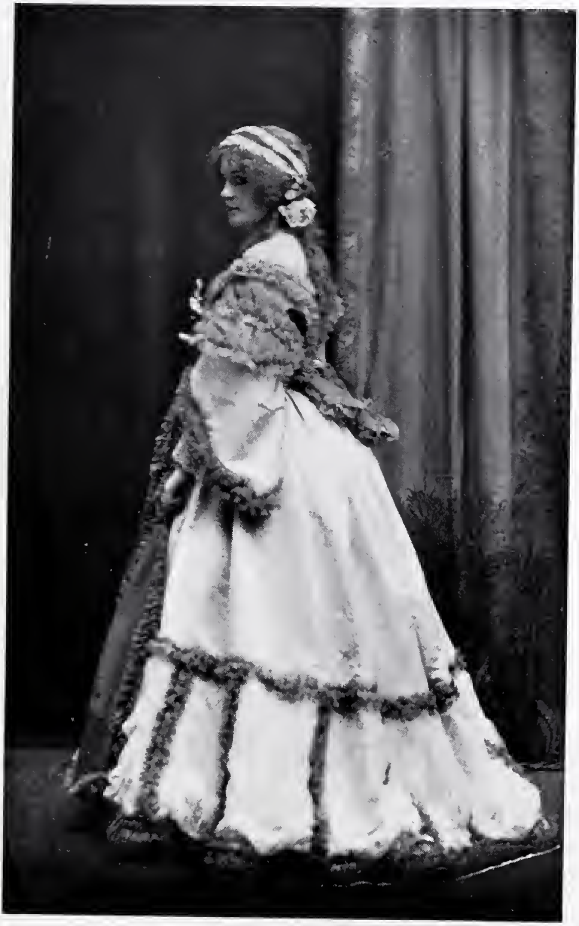
As to the various forms employed in the composition of the figure, I am not sure whether it is wise to say much about them here. The reader who will treat his subject with the aim to get grace of line throughout the figure, bearing in mind the elementary principles which have been referred to, should be able to get a pleasing pose without working for any definite form. The principal forms are, however, the pyramid or triangle, which may be inverted, erect, modified in height or base width; the circle, ellipse, and an oval figure within a rectangle. Of these the pyramid is peculiarly adapted for the single figure and has in consequence been over-done. The ellipse has advantages for large groups, while the oval within a rectangular space may be used for groups of two or three persons. It cannot be too strongly empha-



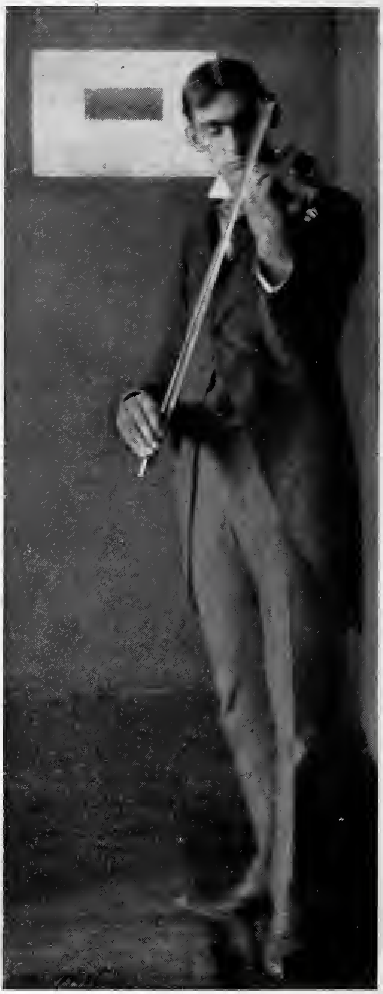
PORTRAIT
By Gertrude Kasebier



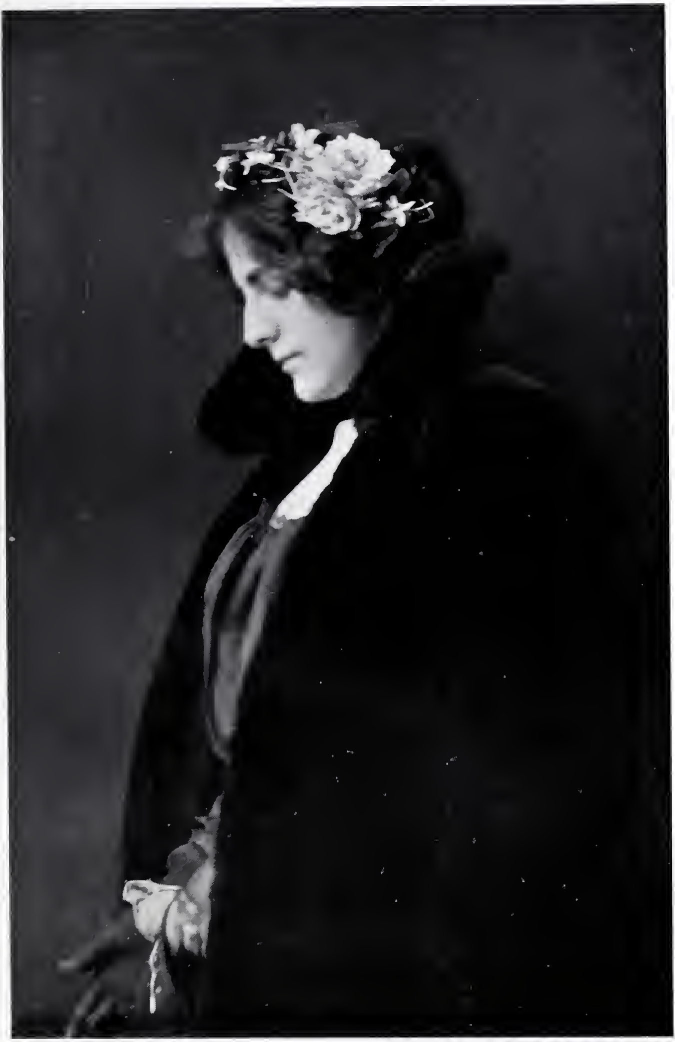
By W. M. Hollinger



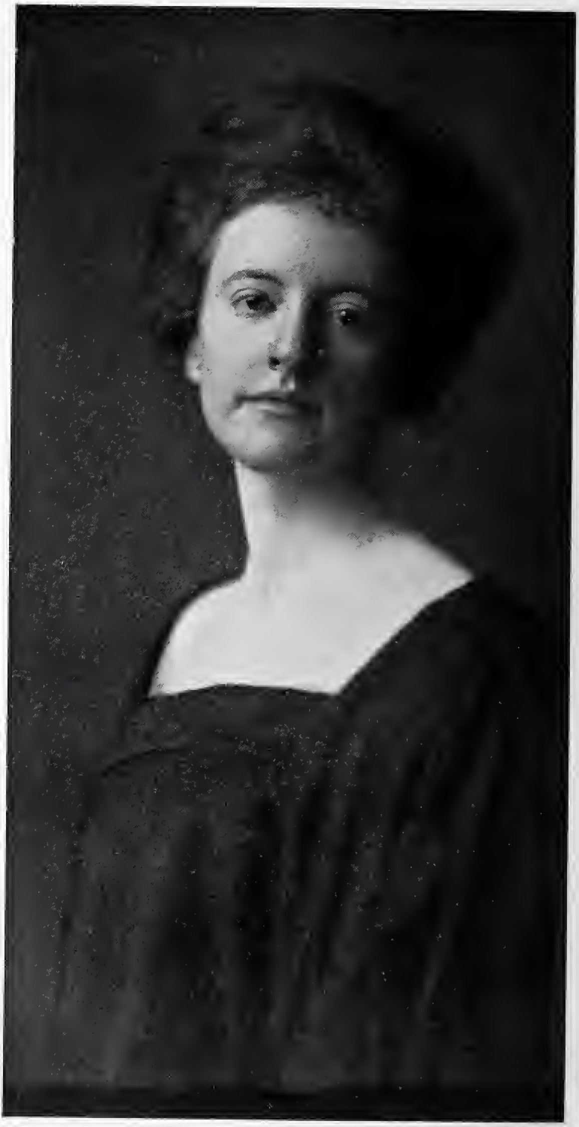
PORTRAIT
By Miss Zaida Ben Yusuf



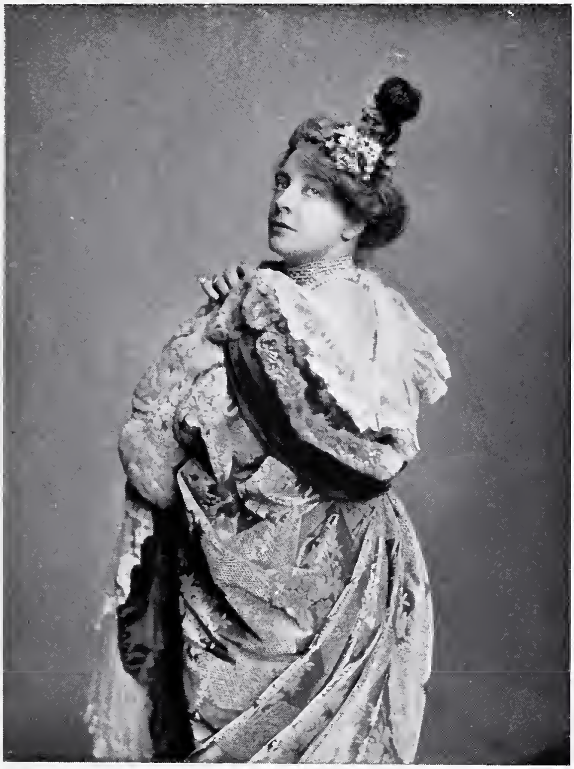
THE VIOLINIST
By Clarence H. White



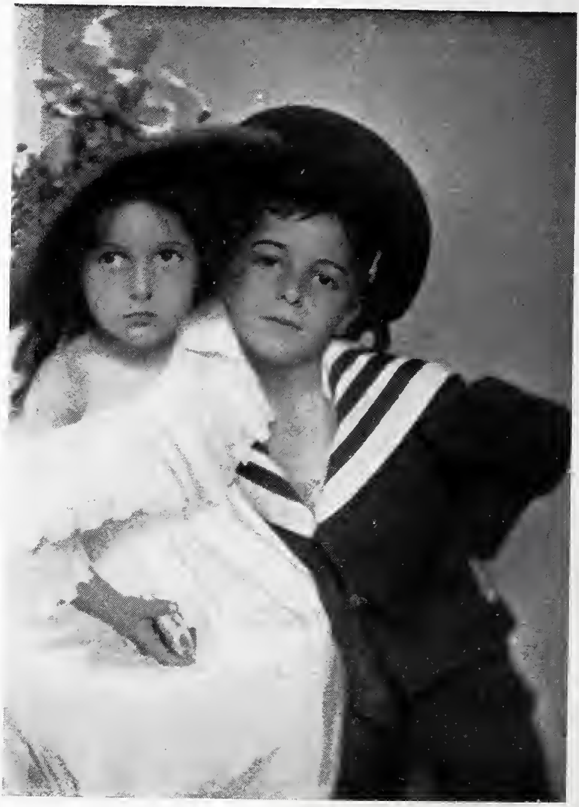
THE GLOVE
By Miss Frances B. Johnston



CONSTANCE
By Miss Mathilde Weil



MISS OLGA NETHERSOLE
By J. C. Strauss



PORTRAITS
By Gertrude Kasebier

sized, however, that these forms should only be suggested when employed, and that their too close following in the *contour* of the pose gives stiffness and formality. How the figure lines may be made to flow gracefully in and out of the pyramidal form is seen in Fig. 8. In using the ellipse for group formation, also, the faces should not be arranged so that the eye can follow the form of the ellipse with perfect regularity. I may here state what is known to many, that convexity of outline will invariably give more grace to the figure or group than the concave line. This may be observed in many of the illustrations in these pages, and especially in the engraving from Mr. Strauss's portrait of Miss Olga Nethersole. Attention should also be given to the proportion of space occupied by the figure within the confines of the picture, and to the shape formed by the relation of the outline at various points to the bounding lines of the picture. Large areas of background are usually to be avoided unless isolation of the figure is intended or desirable. Figures which are too large for the space they occupy are unpleasant; if too small, the effect is stagey. An erect figure with the head bent should always have sufficient space above the head to permit it to be raised (in the mind) without striking the bounding line, other-

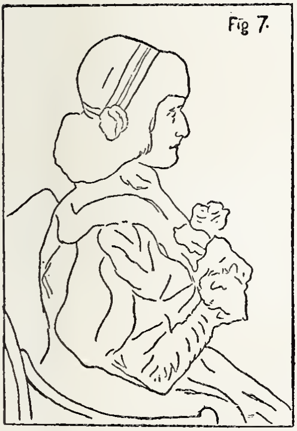


Fig 7·

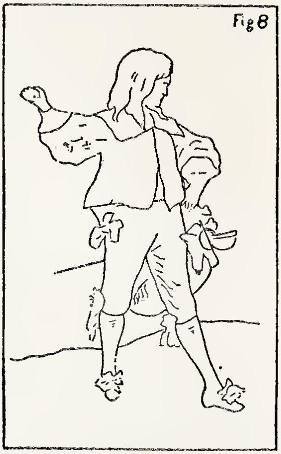


Fig 8

wise the effect will be uncomfortable. In fact all sitting, kneeling, or stooping figures look better if they have sufficient space to stand erect.

**Heads.** The general classes of portraiture are the head or "bust," the half, three-quarter, the full length, the standing, the seated figure, and the group. For many reasons the "bust" portrait is the most commonly desired, chiefly, I suppose, because character is most largely expressed in the face, and also, undoubtedly, because the public has discovered that the photographer can manage a "bust" more successfully than a figure portrait. There is a common notion that it is easier to make a "bust" picture than one showing a considerable portion of the figure. It might be more correct to say that the average head presents less difficulty than the average figure. The clever pose of the one really demands as much skill as the other. First, the head must sit naturally upon the shoulders as part of the body. This is secured by giving the subject a support (chair), which accommodates itself to the body. The height of the chair-seat and the back of the chair should be such that the subject is perfectly at ease, so that the head does not sink into the neck or *vice versa*. The relation between the height of the camera and the head has a considerable influence upon the line and aspect of the latter. To get correct drawing the lens should be on a level with the mouth or chin. This may necessitate raising the sitter by means of a platform, which, however, is more a matter of perspective than of pose. As a rule, the less the photographer manipulates the head of the subject the better, as any attempt to place it in this or that position will inevitably result in constraint and stiffness. If the subject is comfortably seated the head will itself assume its natural and characteristic pose. Sometimes, the subject, as a matter of habit, carries the head inclined to one side. This, of course, requires correction, but if this can be done by suggestion instead of actual manipulation so much the better. At other times a slight adjustment of the head is necessary to correct a crooked mouth or eyebrows which are very uneven in line. The most common fault in posing the head, however, is the straining after opposition between the head and body. Now it is true that a pleasing sense of balance is sometimes obtained by giving the head a different direction from that indicated in the figure, but the rule is not invariable, and where the effect is secured at the expense of ease it is to be avoided. Especially should care be taken to avoid twisting the head so far round that it is brought nearer the camera than it would be in its natural position. This gives an appearance as though the neck had been broken, and is awkward in the extreme. Another common fault is that of placing the head too high, so that the face is inclined upward. When this is done, and the sitter is asked to look at something at the normal level of the eye, when sitting, the confusion between the direction of the eyes and that of the head produces a most disagreeable impression.

**Point of View.**

It is well known that the two sides of the face are not alike; that one gives a more pleasing likeness than the other. It has been asserted that the left side is this more pleasing side, but this has been disputed. In any event, the best side should be sought for and most largely shown where it is a three-quarter view. Whether the head is to be placed to face the light or turned from the light is, of course, a matter which can only be decided by the character expressed in the face. Where this is not of importance the question should be decided by the advantage in line possessed by one side of the head or the other. In seeking to get a good line in the head and shoulders, the photographer should, when possible, travel around his sitter rather than, as is usually done, twist the head until he secures what is desired. Or it may be altogether advantageous to make the sitter seat himself in different parts of the studio (so long as the conditions of illumination are satisfactory). This change of position will, of itself, oftentimes give a more characteristic pose as well as a better line.

Whether the view of the face is to be profile, three-quarter, or full-face depends upon the amount of character expressed by this or that view; the securing of a pleasing arrangement in this detail is of less importance than likeness. The profile will often be the most distinctive, the three-quarter view the most expressive; while the front view of the face is seldom as agreeable as one turned slightly toward one side or the other. In "bust" portraits of women the lines formed by the costume need special care; where the shoulders are made to appear unusually broad by fulness of sleeve or lace about the bust, it will often be well to turn the figure so that the body is seen almost in profile or away from the front view. This will take away the excessive width of bust, give better proportion to the head, and add a more graceful line to the pose.

**Head-Rests.** Much of the stiffness and lack of grace in the average "bust" portrait, apart from the question of its lines, is due to the misuse of the head-rest, an instrument which should be banished from the modern studio. Its use inevitably results in tension and rigidity in the head and neck of the sitter. With the quick-acting lenses and rapid plates now available the head-rest has no longer claim to a place among the tools of the portraitist.

**Three-Quarter Pose: Men.** There are few things which the photographer is so reluctant to undertake as a half or three-quarter figure pose of a man. If you look over the work displayed at any studio, you will find that the portraits of men are almost invariably "heads." "You can do nothing with a man in every-day dress; he is so stiff and ungraceful," is the explanation generally offered when inquiry is made. One consequence of this want of courage is a lack of familiarity with the masculine figure which, naturally, results in failure when work of this sort has to be made to order. The amateur, on the other hand, with his simpler and more direct methods, knowing nothing of that fear of the public which restrains the professional worker at every turn, tries all things, including figure studies, and hence his figure portraits are, as a rule, acceptably interesting. I would like to urge professionals to give more attention to this neglected field as one which affords abundant room for their skill; and I will be glad, indeed, if anything in these pages will encourage my co-workers under the sky-light to attempt the figure more often in their portraits of men. There is really no difficulty about the work which cannot be overcome by observation and practice, and, assuming a reasonable knowledge of composition, no branch of portraiture is more fascinating than the treatment of the figure.

**Stereotyped Poses.** In poses of men, where more than a mere "bust" is desired, the principal difficulty is to secure variety and naturalness without strain or affectation. This is, in part, due to the severity of the lines in masculine dress, and the self-consciousness (with its accompanying rigidity) of the average man when he faces a camera. These conditions being constant, the photographer easily falls into the employment, for all his portraits of men, of a few stereotyped poses which have been found to be acceptable. These stereotyped arrangements, which are well known, are the things most of all to be avoided, while, at the same time, attempts at novel or fancy poses should be shunned with equal aversion. Simplicity is the key to success. In portraits of men we want character and virility rather than novelty or prettiness. If we have strength and ease we can dispense, almost, with grace. If grace can be combined with these, so much the better, but the dominating qualities expressed in the pose should be strength and action, as befits manhood. If we look over a collection of portraits by modern painters (who, necessarily, give more study to the pose than the photographer has time for) we will find that in their portraits of men they rarely attempt anything beyond the simplest pose. Usually the pyramidal form of composition is adopted as most expressive of stability and symmetry; whatever grace the subject may possess is judiciously emphasized by convexity of outline and long, flowing interior lines; the rest is accomplished by harmonious lighting and the obtaining of a characteristic expression to give likeness. An example of this simple treatment is seen in Fig. 9, which roughly outlines a portrait by W. W. Ouless, a painter noted for his clever handling of the masculine figure. The lines in this are well disposed to give the appearance of ease and careless grace, and the figure is adequately supported as shown by the lines of the chair. Another example, this time of diagonal composition, is Fig. 10, outlining a portrait by Sidney P. Hall. A remarkable variety of line, combined with natural simplicity of action, is seen in Fig 11, which I have crudely outlined from Bertha Wegman's portrait of Herr Kolm. Fig. 12 gives a valuable suggestion of the emphatic characterization secured by the use of the profile. It is from a portrait by Otto Greiner.

**Naturalness and Grace.**

If a standing three-quarter or full-figure portrait of a man is desired we must seek first an easy attitude, second a pleasing variety in its lines, and last, but not least, a graceful disposition of the hands. The attitude should be characteristic; every man has his favorite poses

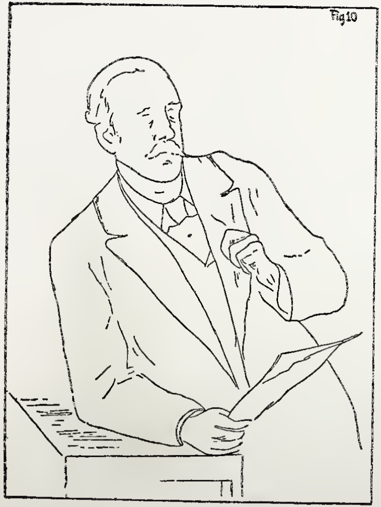


Fig 10

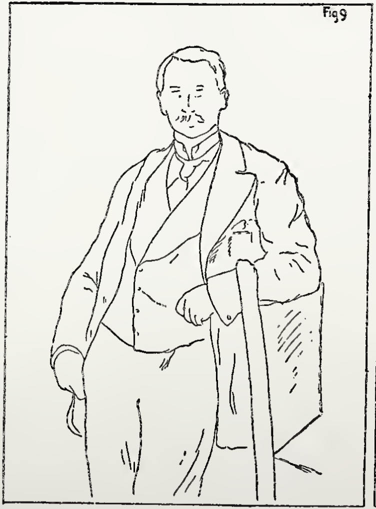


Fig 9

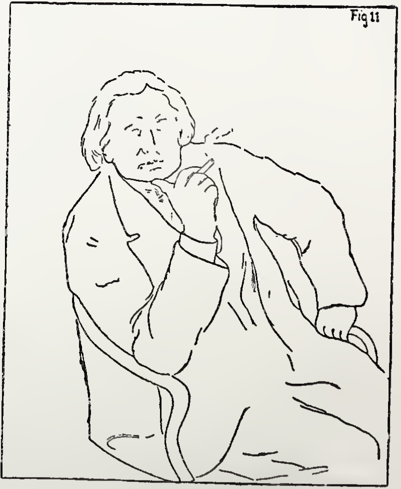


Fig 11

which he takes unconsciously when he feels "at home" in any place. Some of these lack grace, and the endeavor should be directed to finding which of the natural attitudes of the man is most graceful. This can most easily be accomplished by allowing the subject to move about the room at his leisure, when his manner of carriage may be observed. It is folly to at once place a man in this or that predetermined position and "arrange" him to suit your notion of how he should appear. This can only result in awkwardness. In many of the portraits we see of men it is obvious that the subject has been made to take an attitude altogether strange to him, and naturalness cannot be expected under such circumstances. Another very important point in the disposition of the figure is to see that the subject does not rest equally on both feet—something which is wholly incompatible with ease. Attention to this will

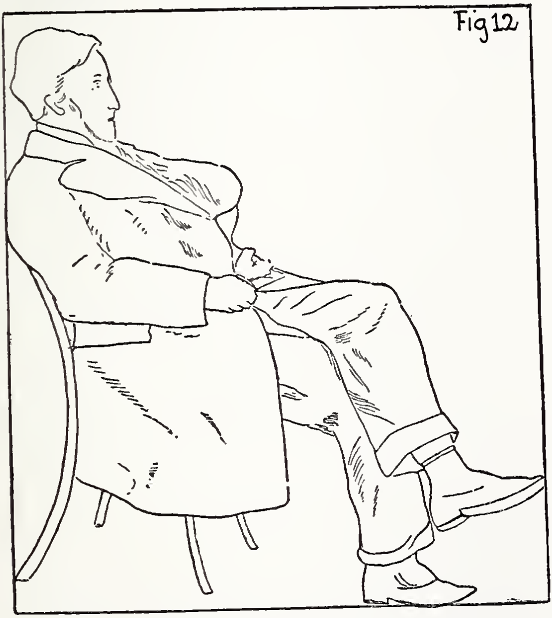


Fig 12

not only secure ease but also gives a greater variety of line to the pose. Speaking generally, old men give a better line when seated, and an easy chair, with its ample flowing lines, gives to such subjects the graceful dignity which belongs to age. Younger men, especially those with slight figures, can rarely be made to look comfortable or graceful when seated and, still speaking generally, such subjects are best handled on their feet.

**The Hands.** The placing and arrangement of the hands in portraits of men is a matter of considerable difficulty. The first care, since they catch the light almost equally with the face, is to see that they do not appear exactly opposite to each other, or form any definite geometrical figure in relation to the face. When they are brought together care is needed to secure a pleasing outline, so that they shall not appear awkward in shape. Neither should the two hands be separately occupied, as this would draw more attention than they should have in a portrait and create confusion. Sometimes the hands are so placed that, even though both are not occupied, each attracts the eye. This can be avoided by subordinating one or both in tone or "value."

The general lines of the pose of a man should, of course, suggest animation, but too much action should be avoided. Remember that angles suggest action, unrest, and motion; vertical lines, support; horizontal lines or long horizontal curves are expressive of dignity and repose. An excellent method of studying the disposition of the masculine figure is to use a lay figure of small size, with which many profitable experiments may be made which will result in greater skill in the general management of the figure.

**Figure Poses: Women.** With women the three-quarter or full-figure pose is generally less difficult than with men, but considering the abundance of opportunity we do not see that profusion of figure-portraits of women which one would naturally expect. And much more rarely, indeed, do we see a pose which has not some obvious and easily avoided defect. Women have more natural grace than men, and less awkwardness of carriage; their draperies, too, offer a more pleasing variety of lines than is possible with masculine dress. Moreover, it is much easier to give a

woman something to do which will supply motive and interest in a portrait, besides enabling one to secure grace of action or harmony in arrangement.

**Flexibility.** The most common fault in portraits of women is the too obvious pose. This is generally expressed in a nervous or conscious strain after attitude. The first element of success, therefore, must be flexibility, the relaxation natural to the figure when it is unconsciously easy. Where this nervousness is observed a good plan is to occupy the subject with some phase of action natural to a woman, as for instance, the arranging of flowers, the " picking up " of the skirt, the opening of a parasol, and the like. In this way by seizing an opportune moment one may secure animation and grace of line in the figure as well as naturalness of expression. This method may be observed in the work of Demachy and Captain Puyo. (See Figs. 7, 13, and 15.) The engraving of " The Glove," by Miss Frances B. Johnston, given on another page, supplies a capital example of this method of treatment. The moment of arrested motion may also be used to secure an animated and characteristic pose, as when a woman turns to greet a friend entering her room, or inclines the figure to take up something from a table, to arrange a lock of hair at the side of the head, etc. In all these details wherein we have pleasure in daily life a portrait may be had which will possess an easier grace than any formal pose.

**The Formal Pose.** It will often happen, however, that a more or less formal pose is desirable to exhibit the figure or the costume. In such cases the pose depends upon the peculiar charm or beauty of these features.

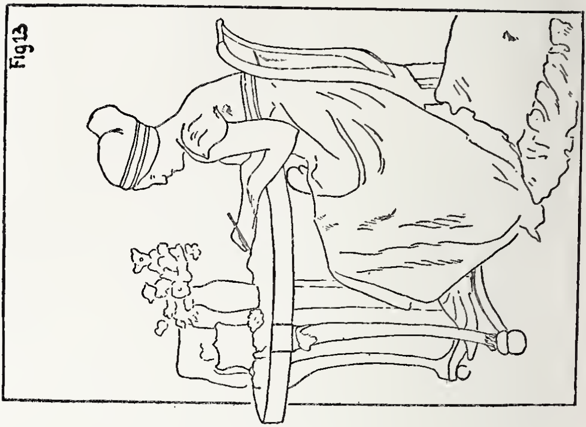


Fig 13

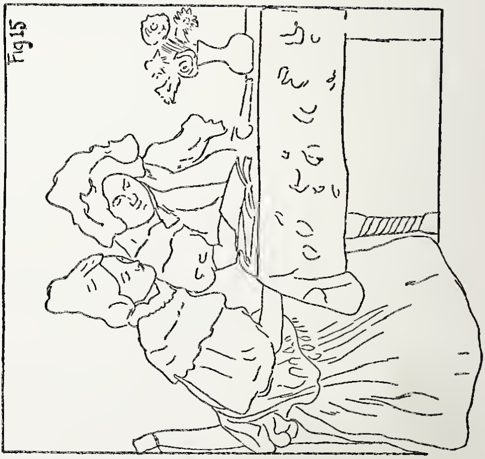


Fig 15

It may be that accessories will be needed to help out the lines, but these must be used skilfully because of their influence upon the proportion of the figure. For instance, in a standing pose of a woman under the average height, a low-backed chair of slight width and with long lines will add height and grace. The softly outlined, flowing folds of a curtain behind the figure, barely more than suggested, will also give the desirable appearance of height, or the subject may be made to stand (if it is accomplished without loss of ease) upon a very low foot-stool or a book placed upon the floor. This latter device is generally adopted where the costume has a train or is of unusual length. The very common habit of permitting a space of several inches between the bottom of the front of the dress and the floor in standing poses should be avoided ; it depends very largely upon the way in which the subject stands. Where the skirt itself is short a sitting pose should be chosen. The standing pose is undoubtedly the best with most women for showing the figure and costume to the best advantage. Stiffness, when it is apparent, may be obviated by giving the figure a slight turn from or toward the light. The profile of the figure, with the head turned to the three-quarter view, generally gives a graceful pose ; in handling a plump figure in this manner, however, vertical lines near to the subject should be avoided as accentuating the curves of the figure in a disagreeable way. If the subject shows a costume with unusual fulness at the shoulders or bust, it is well, where possible, to make use of the hat to give proportion to the head, which might otherwise appear insignificant. Similarly, where the hat gives the head undue proportion, the sitter should be persuaded to remove it. The principal lines of the pose should always be disposed so as to lead the eye around the figure, with the head as the chief point of interest. Abrupt angles, I need hardly say, should be guarded against, and the " line of grace " adopted for the general direction of the predominant lines through the figure. The forms of composition indicated are, of course, the pyramid or the use of the " decorative line." When the pyramidal form is used care must be exercised to see that the centre of gravity falls within the pyramid or the figure will be unbalanced and appear as if ready to fall over. The alternative method is advantageous when the figure is in any other than an erect position; in its use a sense of balance is the essential thing to be secured after grace.

**Things to be Avoided.**

In both standing and sitting poses the carriage of the head has great influence upon the success or failure of the portrait, altering its outlines in a remarkable way, both as regards proportion and general effect. The lines formed by the dress when the subject is seated offer considerable difficulty in their harmonious arrangement, having a tendency to fall into triangles the apex of which is indicated by the knees. This difficulty may be obviated to some extent by selecting a chair of the right height for the particular subject—*i.e.*, one which is neither too high nor too low, so that the knees are not elevated. The sitter should also be seated well forward, so that the legs are bent at an acute rather than a right angle; in this way the folds of the skirt will fall more freely. The practice of drawing the dress tightly about the lower part of the body, showing the form of the hips and figure, cannot be too harshly condemned. In like manner, a standing pose is often seen in which the hands are joined over the lower part of the abdomen, this latter catching the light and so being made the more prominent because it is framed by the arms. A similar fault is that of seating a woman in *décolleté* dress too low, or inclining the body too far forward, so that the shoulders and bust are displayed in a way bordering upon vulgarity.

**The Hands.**

The most troublesome feature of the figure-pose, however, is the disposition of the hands, about which women are sensitive to a degree. In consequence of this we find in looking over a number of portraits of women that the hands are most often conspicuous by their absence. Sometimes they are placed behind the back, or hidden under the pages of a book, or fan, or among a few flowers; at other times they are hidden by folds of the skirt, or by a cape. When shown, the general complaint is that they are too large, a notion which has some foundation in truth, but also largely the result of the invariable practice among painters to represent the hands smaller than they are in life. There are various ways of meeting the difficulty, the best of which is to make one's self thoroughly familiar with the hand, its anatomy, its expressiveness, its varieties of arrangement and most graceful positions. Very much depends upon the lens and the distance of the hands from the point or plane of the principal focus. If two photographs of a hand are made, the one with an eight-inch (focal length) and the other with an eighteen-inch lens, the difference in result will explain the influence of the lens in a startling way. That the hands increase in apparent size and awkwardness of proportion according to their nearness to the lens is a matter of common knowledge which does not receive the attention it deserves.

In the treatment of the hands the first rule should be to avoid showing their full width, or, if they must be so placed, to see that they are so lighted or modelled by shadow that their apparent width is lessened. Sometimes one hand may be completely in half-shadow with advantage. When a head, for instance, is posed leaning upon one hand, the effect is much better if the hand be against the dark side of the face and thrown into shadow by the head; and when the hands are not placed close together, so as to make a group in themselves, it would, I think, always be better to subdue one of them somewhat by shadow.

As we have in the hand a repetition of the same form several times in the fingers, we must endeavor to vary them somewhat. When the fingers are extended straight out and held close together, the effect is stiff; and if they be kept straight and spread equally, the result is a sprawled, awkward look. When the hand is open, three fingers pose together better than two, and some of the fingers should be drawn up, but not all equally. A completely doubled-up hand is not good—it is too like a fist; but a pose in the position of holding a pen or pencil, as when writing or drawing, is one which looks well from many points of view. A very bad arrangement of the hand is when it is held flat and the fingers doubled up to the second joint; the squareness of the form and the impression of the ends of the fingers being cut off are very unpleasant. Again, the hand very much doubled up, but the index finger fully extended, is an arrangement which looks exceedingly awkward from several points of view.

A graceful pose is to bring the thumb and second finger slightly together, with the remaining fingers slightly raised. In this position turn the hand in any way you choose, and you will find agreeable lines, which will need but little correction to appear pleasing.

The wrists as well as the arms will play important rôles in the composition of lines, but can be mastered with very little observation.

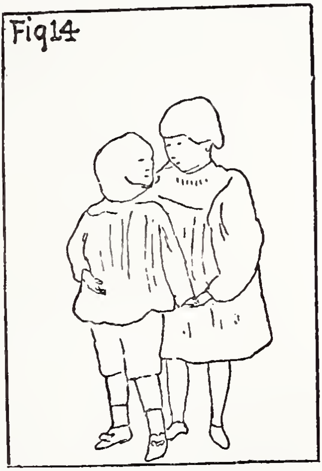
When the sitter is a person of education or refinement it will often be noticed that the hands naturally assume a graceful position; where this is observed the natural arrangement should be accepted. It is always the most characteristic when unconcerned, and drawing the attention of the subject to the hands will almost invariably result in awkwardness.

**Children.** The most delightful subjects in all portraiture are the children, and their greatest charm, from our point of view at least, is that they require no assistance in the matter of pose. Here, in truth, we can agree with those who say that the best way to pose is not to pose at all. Give the children toys, busy them with the thousand and one occupations appropriate to childhood, make them feel "at home," have plenty of patience and a goodly supply of plates, and your success is assured. There are, however, a few points about the treatment of children which may be mentioned here with possible advantage. In dealing with babies (clothed), see that the child is not lost in a mass of white linen, show the whole of the face and both the hands; with babies minus clothing of any kind, care is needed to get a good line and to avoid unsightly creases or folds of the flesh over the abdomen. Incongruity of accessory is a common failing in portraits of this class. Chairs with pronounced lines, fur rugs or draperies with obtrusive patterns, may be mentioned as things to be particularly avoided. When a young child is to be photographed on the mother's knee, it is better to pose the mother looking down at the child; otherwise attention may be diverted from the latter, which, of course, is the chief interest. Where children between three and eight years of age are concerned, the essentials are to overcome timidity or nervousness, to get them interested, and to get rid of the "grown-ups" accompanying them; these points gained, the rest will be easy sailing. From eight to fourteen is a period of awkwardness of form with most children, but here, as in earlier years, the simplest pose will be most successful. With girls a three-quarter figure pose will often give graceful outlines, but with boys rarely more than a head should be attempted. Where two or three children are to be photographed together (of the same family), a very graceful arrangement may be secured by locking the figures together, as in Fig. 14. Any appearance of formality in the composition of such groups must, of course, be avoided, and the combinations provided by the children in their play with each other will usually suggest an arrangement.

**Groups.**

From what we have learned of the treatment of the single figure it will be easily understood that the making of a portrait group is by no means a simple task. We have to overcome, not merely the difficulties of each figure and the peculiar awkwardness which possesses people when being photographed together, but also the greater difficulty of securing a pleasing arrangement of several persons, each of whom requires an equally good portrait, so that we are debarred the use of the principles of subordination and contrast upon which the unity and interest of such pictures depend.

Fig 14



In small groups of two or three people, intimate friends or members of a family, a pleasing arrangement is not so difficult; they may be interested in the reading of a letter or book, or engaged in conversation or occupied with the antics of a child. Small groups of young men or young women are also easy to manage because they may be occupied in something of common interest, as we see them in Fig. 15. When the lower parts of the figures present difficulty, the seating of the figures at a table will obviate the difficulty. In such pictures the form of the composition may be pyramidal, or we may simply seek a well-balanced arrangement and variety of line in

**Two or Three Figures.**

the position of the heads or in the figures. Beware of confusion of interest, or too much complexity. The figures should not be too close together, nor the combination too large for the space it occupies, or the effect will be unpleasant. Sometimes the horizontal form suggests itself, as in a group of three children of which the half figures only are shown; in such a case the figures can be made to overlap each other, especially with children, but great care is needed here to secure a graceful outline of the heads. Speaking generally, a convex outline is preferable in all groups as giving solidarity, boldness, and grace; this line need not depend upon the figures but may be secured by draperies or accessories which, however, are not to be used unless directly helpful. Angles, and especially right angles, and parallel lines of heads are to be avoided since they disturb the eye and prevent it from uniting the various parts of the group, which is essential to its unity. The heads are always the chief points of interest, and their relative position is the most important factor in the success of the group. They should not be so placed as to form any regular or geometrical pattern, nor placed directly above each other. Very little differences of position are important here, and will give pleasing variety. The lines connecting the figures composing a group should be as simple and as graceful as possible; thus a harsh, horizontal line between two figures will give the appearance of separation rather than of unity. Repetition of the same line or curve will sometimes be useful to convey a sense of unity obtainable in no other way. Converging lines should be avoided unless there is some point of special interest at their convergence, as they will concentrate interest there.

**Large Groups Indoors and Out.** Large groups, especially those made indoors, present peculiar difficulties in arrangement and the result is invariably compromise. When fifty or sixty men, for instance, are to be grouped in a studio space of six by sixteen feet, it is inevitable that the result will be a mass of heads arranged like shelf specimens in a museum. Even in such a case, however, if the heads can be arranged in elliptical lines around a central group it will be more interesting than the parallel line group so commonly seen. In making a large group outdoors one has more liberty of arrangement, especially when a doorway with steps leading thereto is available, permitting of variety of line and subordination without detracting from the value of the group as a collection of separate portraits. Perhaps the best plan to follow in handling such a group is to form a series of smaller groups in pyramidal form, all falling within the lines of a larger pyramid without the frame-work being too much in evidence. In dealing with a group where the support is flat, as on the veranda of a country house, variety of line may be had by seating some of the figures and causing others to incline as if in conversation. There should always be some sinuous line connecting the figures so that none may be isolated and the effect of unity be lost. Whenever it is possible to express action in a group this opportunity to get variety of pose and unity of arrangement should not be lost; thus a number of people may be arranged as coming out of a doorway, or ascending a stairway. In such forms of composition the variety is infinite and the common purpose gives completeness of interest. Usually the most important figure should be surrounded by a barely perceptible line passing through the heads of the others in the group and converging to the point of direction.

**The Cultivation of Instinct.**

This brings us to the end of our survey of the pose in portraiture. We have seen that its purpose is to assist in securing likeness by characterization, and to give pleasure by accentuating the most desirable characteristics of the subject. The principles of composition applied to the figure—simplicity of design, concentration of interest, fitness, the line of grace, contrast, balance, repetition, subordination, variety, and stability—have been laid bare, and the forms usually employed have been suggested. The applications of these constructive principles, with a number of hints touching particular classes of subjects, have also been placed before the reader from the pose of a single head to the arrangement of a group. These things, however, are but the A B C of the art of composition and must be followed up by continual observation of what is interesting and what has grace or beauty in nature and art as we see them in every-day life. It is not the knowledge of rules that will enable one to get beautiful arrangements in portraiture, but such an intimate appreciation of their significance as will direct their modification according to the needs of the subjects with which we have to deal. In this way, by continual observation of the figure in life and in all forms of pictorial representation, the principles are buried beneath the cultivated instinct, from which arises the pose which gives us not only what is characteristic and pleasing in the subject portrayed, but also that sympathetic interpretation which compels at once our interest and admiration.

## BOOKS

Among the books which may be profitably studied by those interested in composition in portraiture may be mentioned these following:

*Figure Drawing and Composition.* By R. G. Hatton. 2d Edition. 1898. 307 pp. Profusely illustrated. $3.

*Burnet's Art Essays* (No. 2: *Composition*). Especially useful in its suggestions on grouping. Illustrated. $1.25.

*Pictorial Effect in Photography.* By H. P. Robinson. 4th Edition. 1893. 193 pp. Illustrated. $1.50.

*The Studio and What to Do In It.* By H. P. Robinson. 14th Thousand. 1898. 150 pp. Illustrated. $1.

*Wilson's Photographics:* Containing a valuable chapter on the "Treatment of the Subject." Illustrated. $4.

*Amateur Portraiture.* By F. Dundas Todd. 50 cents.

*Artistic Posing for Photographers.* By J. Russell Wallace. A series of illustrated papers now appearing in *The Photo Beacon*, to be published in book form during the year.

# NOTES

THANKS to our friends, and salutation to the critics —alike outspoken concerning the first number of THE PHOTO-MINIATURE. Together they have almost exhausted the edition of 3,000 copies, which we thought a sufficient number to spring on an unsuspecting public. To *sell* over 2,700 copies of a new photographic magazine within twenty days after publication is, at all events, a satisfactory beginning. What more could mortal desire, except to be obliged to reprint? And that we are preparing to do.

THE PHOTO-MINIATURE has no room for self-praise and, therefore, all the good things said about our first number are condensed in the broad sentiment that "it is a good quarter's worth!" But the critics! We make room for them—the dauntless three—nameless here, but worthy of all honor. The first, of course, hailed from Boston. "Publicly, I approve of THE PHOTO-MINIATURE, and shall have pleasure in recommending it to my friends; but, privately, it lacks ...." mention of the one manufacture in which he is most interested! Dear old Boston! The second critic was a Philadelphian, and an advertiser. We are especially sensitive about the criticisms of prospective advertisers—they help to pay the printer. This advertiser protested that he "did not like advertisements to face reading-matter; it gave them too much publicity!" This criticism is above comment. Last, but not least, came a critic (most amiable of men) who lamented that "it was too commercial." What he was driving at we have not been able to discover with any certainty.

Not another word. THE PHOTO-MINIATURE is made for those who need it. If it satisfies those who need it, it fulfils its end. If not—there is still the end, the other end. Which end it shall reach time alone can tell. The man who wants a little book on *Modern Lenses* should send for a copy of THE PHOTO-MINIATURE, No. 1. Price 25 cents. "A good quarter's worth."

◆

Mr. Walter E. Woodbury, who for the past five years has edited *The Photographic Times*, has now joined the Nepera Chemical Company, and will, we believe, be in charge of the publicity department. To endeavor to improve on the methods which have been followed in pushing Velox in the past is something like trying to improve on perfection—if results may be taken as a criterion—but Mr. Woodbury is the right man to undertake the task.

*The Photographic Times* will be continued by the same capable staff who have assisted in the past, and will maintain the high level which it has hitherto so consistently held. The guidance and experience of Mr. W. I. Lincoln Adams will doubtless aid from time to time, especially in the pictorial part of the work.

◆

Change in Paper Prices.—The advance of 60 per cent. in the price of raw paper-stock used in making photographic papers has, of course, had its effect on the sensitized paper market. Some papers have been advanced 60 cents per gross in price, or from 75 cents to $1.35 for cabinets. The American Aristo Co., whose products are perhaps most largely used, has, however, made very few changes in its price-list, the only real advance quoted being 25 cents per gross on Aristo Jr. cabinets. The price of Aristo Platino remains unchanged.

The discounts hitherto allowed to dealers have, of necessity, been altered, and this will undoubtedly affect some few large consumers.

The changes in the market, therefore, concern the professional more closely than the amateur photographer and, as indicated, the large majority of the users of high-class collodion papers are not at all affected. That the advance in raw stock will compel the low-price photographer to raise his prices for work is, we think, a benefit rather than otherwise.

That the American Aristo Co. can afford to leave its price-list practically unaltered is due, as is generally known, to the enormous volume of business handled by this firm, enabling it to reduce the cost of its manufactures below that of other concerns by the economy which invariably accompanies such conditions.

No thinking photographer who is acquainted with the history of the last ten years will give much heed to the howl about trusts and corners which is made in some quarters—as a method of advertisement. The record of

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❧

The Michigan photographers at their annual convention discussed the question, "Does the amateur injure the fraternity?" Only one photographer thought the amateur an evil. Many, on the other hand, thought he was by all means to be encouraged, not only because he supported the small supply businesses which so many photographers are starting, but also because the amateur was a large direct patron of professional work, his knowledge of photography leading him to go to the best studios and to pay for a good class of work.

❧

The Third Annual Convention of the Wisconsin Photographers' Association met at Milwaukee in March, under the leadership of President Klein, of Milwaukee. The meetings were well attended and much enthusiasm was shown in the work of the Association. Resolutions were passed supporting the work of the Photographers' Copyright League of America, and granting an appropriation in aid of the League. Milwaukee was chosen as the location for the 1900 convention, and the following new officers chosen for the ensuing year: *President*, Henry Klein; *First Vice-President*, J. F. Denninger, Neenah; *Second Vice-President*, R. H. Fitch, Elkhorn; *Secretary*, A. S. Ralph, Columbus; *Treasurer*, Cyrus Chadbourne, Fond du Lac, Wis. The annual dues of the Association were raised from $1 to $2 per year. Professor Griffith gave several addresses on the "Art Side of Photography," which were keenly appreciated by all who heard them. The prize in the *Special Class* (Bronze Figure), open to photographers outside of Wisconsin, was awarded to Elias Goldensky, of Philadelphia; George W. Varney, Chicago, and Parker Willis, Crawfordsville, Ind., being second and third respectively. George E. Thomas, Racine, secured the loving-cup (Sweepstakes Class) and the gold vase (Genre Class); and A. G. Kurz, Green Bay, won the first prize in class A (Portraiture). A special feature of the convention

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was the loan collection by prominent photographers: among these exhibits may be mentioned a medallion head, sent by Julius Strauss, St. Louis, and a composition, "Nature's Seasons," by Klein & Guttenstein, of Milwaukee.

The photographers of Wisconsin are to be congratulated upon the success of their State Association, and also upon their choice of officers, which includes some of the highest men in the profession.

❧

As a live and successful body, the California Camera Club is second to none. From the annual report just issued we gather that the membership roll has added one hundred and fifty names during the year; and from the Club funds $4,000 have been spent in thoroughly equipping an art department and gallery. To most club officials such a state of things would appear perfection, but the California Camera Club, true to the principles which have placed it in the position it holds, has made arrangements for drawing its members still closer together, and to promote more social life.

❧

The religious work of F. Holland Day was the subject of a recent article in *The Photogram*. Several reproductions of his pictures were given, and they have called forth an interesting correspondence from many of the leading English photographers, and especially from the professional worker. The comment is an almost unanimous condemnation of any attempt to represent by photography scenes in which Christ appears. There is little of blunt, dogmatic opinion. Each writer carefully and moderately states his conviction, and it is evident that many of them write with a strong religious feeling. The most interesting is the statement of M. Bovier, a French worker, who a few years ago enthusiastically published a picture of the dead Christ—*Christ au Tombeau*—a picture which attracted wide-spread attention. M. Bovier now sums up his conviction in one word—Hopeless.

❧

Our sparkling contemporary *The Professional Pointer* has a tilt against the "new photography" or, as it prefers to call it, the "freak and fad photography." Here is the scathing denunciation:—"Clumsy imitations of

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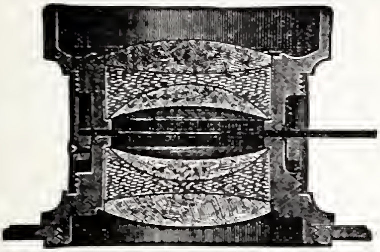

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vague suggestiveness consisting of dead, opaque shadows without detail, yellow whites without half-tone gradations, and a generally sunken, fuzzy surface print entirely without life or brilliancy, pasted at one end on any old thing made of pasteboard, and then dubbed as a piece of art photography worth from ten to twenty-five dollars per copy."

◆

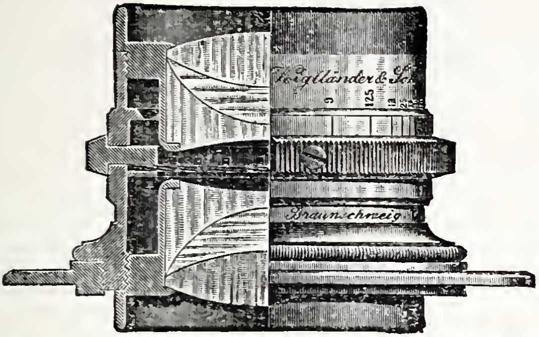
The third annual convention of the Pennsylvania Photographers' Association was held at Wilkesbarre a few weeks ago, under the leadership of President E. E. Seavy, of New Castle. The attendance was larger than in previous years and the interest shown in the work of the association shows corresponding growth. Much of this is doubtless due to the untiring efforts of the association's officers, who have left no stone unturned to bring the advantages of organization before the photographers of the State.

In the list of awards made at the convention we note that the gold medal of the *open class*, in which all photographers may compete, was awarded to Mr. James Arthur, of Detroit. Mr. Frederick W. Wishart, of Pittsburg, won the only award open to amateurs. The *Grand Prize* of the association was carried off by Mr. David Rosser, of Pittsburg, in which city the convention of 1900 is to meet late in April of that year. The new officers for 1899-1900 are: *President*, J. B. Schriever, Emporium; *First Vice-President*, Charles L. Griffin, Scranton; *Second Vice-President*, Joseph Stearns, Titusville; *Secretary*, David Rosser, Pittsburg, and *Treasurer*, W. I. Goldman, Reading.

The work exhibited at the convention showed that those who have attended in years past have gained large advantages by their enterprise. Special improvement was evidenced in the work of L. V. Kupper: Ginter & Cook, of Lewisburg; Elias Goldensky, of Philadelphia; J. H. Springer, of Scottdale, and Miss Kate Jamieson, of Jeanette, Pa.

◆

*Tolidol.*—We have received samples of this new developing agent from the Haller-Kemper Co., Chicago, and have given it careful trial. Tolidol may be had in bulk, or combined with pure alkalies in the form of "Automatic Developer Tubes," the combina-



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tions being varied for the different brands of plates, films, and papers in the market. Tolidol itself is a white crystalline powder which dissolves readily in water and, as far as our few weeks' experience proves, keeps in solution or in its dry form without deterioration. The two chief features of Tolidol are its power of bringing detail up in a negative, even with the shortest exposure, and its great convenience. It is, we believe, the first "ready-to-use" developer introduced which is separately adapted to meet the requirements of this or that make of plate or paper. Thus we have Tolidol specially prepared for Lovell plates, for Seed plates, for Cramer plates, for Velox paper, for snap-shot films, each in separate capsules, ready to use when the contents of a capsule are dissolved in twenty ounces of water.

For those who prefer to make their own developers, the manufacturers of Tolidol offer a variety of carefully considered formulæ for portraiture, landscape, and reproduction work. As an instance of the convenience and efficiency of Tolidol we relate our first experience with it. Returning from a holiday we desired proofs of five negatives made during the trip. Having used the Lovell plate, we dissolved the Tolidol for Lovell plates in twenty ounces of cold boiled water and used a single four-ounce solution for the development of the five plates. The subjects were snow-scenes, among the hills, with broad masses of sunlit snow and evergreen—not very promising unless one's developer had been carefully handled. Four out of the five plates came up splendidly, the fifth being spoiled by light fog. The action of the developer was rapid, but easily controlled by dilution or the addition of a drop or two of a ten per cent. solution of potassium bromide. The delicate gradations of tone were well kept, even in the highest lights, while the amount of detail in the denser shadows was surprising. As soon as our negatives were fixed and washed, a bath in wood-alcohol enabled us to dry them quickly, after which we managed to get a couple of crisp Velox prints from each one before retiring, using for this the special Velox developer supplied by the manufacturers of Tolidol. The saving of time, worry, and labor here made possible by Tolidol will be apparent and, combined with the merits of the new agent, will undoubtedly win for Tolidol great popularity among busy photographers.

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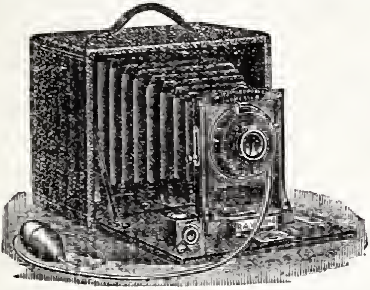

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The Photographers' Copyright League of America held its annual meeting at the Fifth Avenue Hotel, New York, recently, when a very satisfactory record of work done during the year was presented by the secretary, Mr. C. E. Bolles, 244 Fulton Street, Brooklyn, N. Y.

In his annual address the retiring president, Mr. B. J. Falk, urged photographers to give more energetic support to the League in its work for the protection of photographic copyright. This is a good work in which amateur and professional photographers may unite for mutual benefit. The protection of copyright is valuable to all who make photographs, and the work of the League for the safeguarding of these rights deserves cordial encouragement. Membership in the League may be secured by simply sending name and address, with a request for enrolment, to Mr. Bolles, as above. There is no fee attached to enrolment, but voluntary contributions are needed to carry on the work of the League.

Several photographic societies, amateur as well as professional, have officially recorded their approval of the object of the League, and it is hoped that, erelong, American photographic workers will be as well organized for their common protection against the unauthorized use of their work as are English photographers. In the latter country the Copyright League has been enthusiastically supported, and is now a very direct help to its members in obtaining the credit and remuneration which should accompany the publication of pictures of value or interest.

◆

Philadelphia Photographic Salon, 1899.—The Pennsylvania Academy of the Fine Arts has the honor to announce that under joint management with the Photographic Society of Philadelphia, the Philadelphia Photographic Salon for 1899 (second year) will be held in the galleries of the Academy, from October 22 to November 19, 1899.

The success of the first Salon has conclusively demonstrated the existence of a field for an American exhibition devoted exclusively to pictorial photography in its highest sense.

The aim of the Salon is to show only such pictures produced by photography as may give distinct evidence of individual artistic feeling and execution, rigidly se-

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lected by a jury composed of well-known artists and artistic photographers, whose certificate of acceptance shall be the only award.

All those interested in the purpose of the Salon are invited to give it their cordial support and encouragement, both by submitting specimens of their best recent work and by making it favorably known to others.

A full circular, with all details, entry forms, etc., may be had from Mr. Robert S. Redfield, care of the Photographic Society of Philadelphia, 10 South Eighteenth Street, Philadelphia.

◆

The Eighth Annual Exhibition of the Capitol Camera Club, Washington, D. C., is announced for May 8th to 13th. It is open to local amateurs only, and is in charge of C. Francis Jenkins, 1010 F Street, N. W.

◆

Messrs. Ross Ltd., London, have just introduced a new Symmetric Anastigmat, working at *f*/5.6, for which they claim all the advantages of non-astigmatic construction with unusual rapidity.

◆

The use of the magic lantern is rapidly increasing among American photographers. Lantern work is one of the most pleasurable of photographic recreations, and has the advantage that it fills the whole year with the making of negatives, slides, and the projection of the slides when made. We know of one amateur who is so devoted to the lantern that he has never made a print from his thousands of negatives, although they have all served as material for slide exhibitions, by which he has given pleasure to his large circle of friends during many winters.

◆

A good plate, which must be reasonable in price, is something indispensable in these days of magazine cameras and rapid exposures. American plates are so uniformly good and reliable that it would be folly to say that this or that brand is superior to any other. There is, however, a difference in the prices of the plates in the market, and so we have reasonable ground for mentioning the Lovell plate as equal to the best in quality but more reasonable in price than some others.

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In the March issue of *Wilson's Photographic Magazine* may be found a paper on "Women in Photography," read by Mr. Richard Hines, Jr., before the Art League of Mobile, Ala. It is, we believe, the most complete digest of information on the subject at present available, and should be interesting to those of the fair sex who find in photography the most delightful of hobbies.

❧

*The Eastman Kodak Co.* has secured a decision from the Tribunal of Paris affirming its sole right to the use of the word KODAK. This confirms an earlier decision by an English court to the same effect.

❧

*The London Graphic* announces an amateur photographic competition open to the world, with prizes ranging from $100 to a Pocket Kodak. The prize pictures will be published in the *Graphic* with such others as the judges may think worthy of special mention. A fee of one guinea ($5) will be paid for each picture reproduced, with the exception of the prize photographs. We recommend this competition to American photographers as worthy of their attention. The rules are as follows:

1. No competitor to send in more than six photographs whether mounted or unmounted. 2. In every case a stamped addressed wrapper must be inclosed for the return of the photographs. 3. Acknowledgment will be made in *The Graphic* week by week of all photographs received. 4. Photographs will be received any time up to June 1, 1899. 5. The name and address of the sender and the title of the subject should be legibly written on the back of each photograph. 6. Photographs may represent either figures, land or sea scapes, animals, architecture, etc. 7. Every endeavor will be made to return unused photographs, but the manager will not hold himself responsible for loss or damage. 8. All communications to be addressed to the Manager of *The Graphic* Amateur Photographic Competition, 190, Strand, London, W. C.

ART CATALOGUE

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Portrait groups.—An interesting example of the capacities of the *Collinear* lens for portrait group-work reaches us from the Voigtlaender & Son Optical Co., of this city. This is an 8 × 10 group of twenty-one figures made with a *Collinear* lens of 7 inches focal length, at full aperture. The figures are all equally well defined, whether in the front row of the group or at the back, some four or five feet away from the foremost figures. When it is known that the group was made with a lens listed to cover a 5 × 7 inch plate, this depth of definition is remarkable, and speaks well for the objective. We are asked to state that the Voigtlaender & Son Optical Co., 467 West Fourteenth Street, New York, will be glad to send their new catalogue of *Collinear* and other lenses to those applying for it.

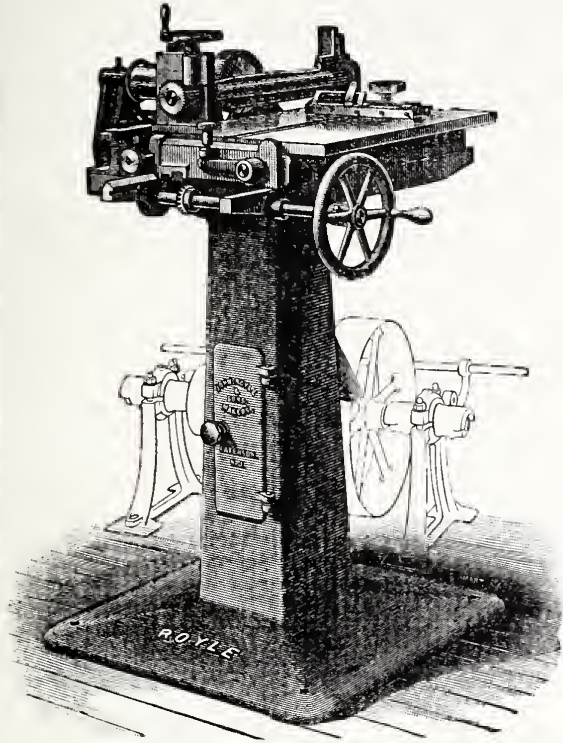
❧

Mr. J. W. Willard, the editor of *Snap Shots*, New York, after active photographic service extending over almost half a century, is about to retire and enjoy what he terms "a long, long vacation." Hundreds of photographic workers who have come in touch with Mr. Willard's genial personality during his long and busy life in New York will miss his familiar figure and ready help. We are glad to know that we are not to lose him altogether, inasmuch as he will still continue the editorial management of *Snap Shots*, with which journal he has been associated for some time past. May he have many years of the quiet enjoyment of life which he has so richly earned.

❧

*A Treatise on Photographic Optics*. By R. S. Cole, M.A. 12mo, 302 pp.; 132 illustrations in the text and folding plate. Price, $2.50. 1899. New York: D. Van Nostrand Co. (For sale by Tennant & Ward, 289 Fourth Avenue, New York.)

To those who desire to supplement what was said about lenses in the first number of THE PHOTO-MINIATURE, or who seek to acquire a scientific knowledge of photographic optics, we advise a careful study of this latest text-book on the subject. While Mr. Cole has written for the student rather than to provide a popular hand-book on the lens, he explains his subject in as simple a manner as is consistent with thoroughness. The



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result is a clear and comprehensive manual which will, we feel sure, take its place as a standard work upon the subject with which it deals. The book is profusely illustrated with diagrams which really illustrate the text, and the various divisions of the subject are set in numbered paragraphs for convenience of reference. The work is one which may be especially commended to photographic societies, technical and public libraries.

◆

The forthcoming convention of the Photographers' Association of America, to be held at Celoron, on Chautauqua Lake, N. Y., in July next, promises to be an affair of much interest to the professional worker. As at present outlined, the programme of the convention overflows with opportunities for instruction and social pleasures. The exhibition department is to be especially attractive, most of the leaders of the fraternity having signified their intention to send examples of their recent work as complimentary exhibits. Full information and details may be had from the Secretary of the Association, Mr. George B. Sperry, 319 Summit Street, Toledo, O., and we would urge our professional readers not only to be informed as fully and as early as possible, but also to prepare to visit the convention and take practical advantage of the benefits it offers them.

◆

An International Photographic Exposition, on a larger scale than has yet been attempted in this country, is announced, to be held at Madison Square Garden, New York, during the autumn. Important contributions have already been promised from England, France, Germany, and Austria, and the leading American manufacturers have also promised their enthusiastic support to the enterprise. The executive offices of the exposition are located at 11 Howard Street, New York, where all communications should be addressed.

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Vol. I. No. 3. June 1899

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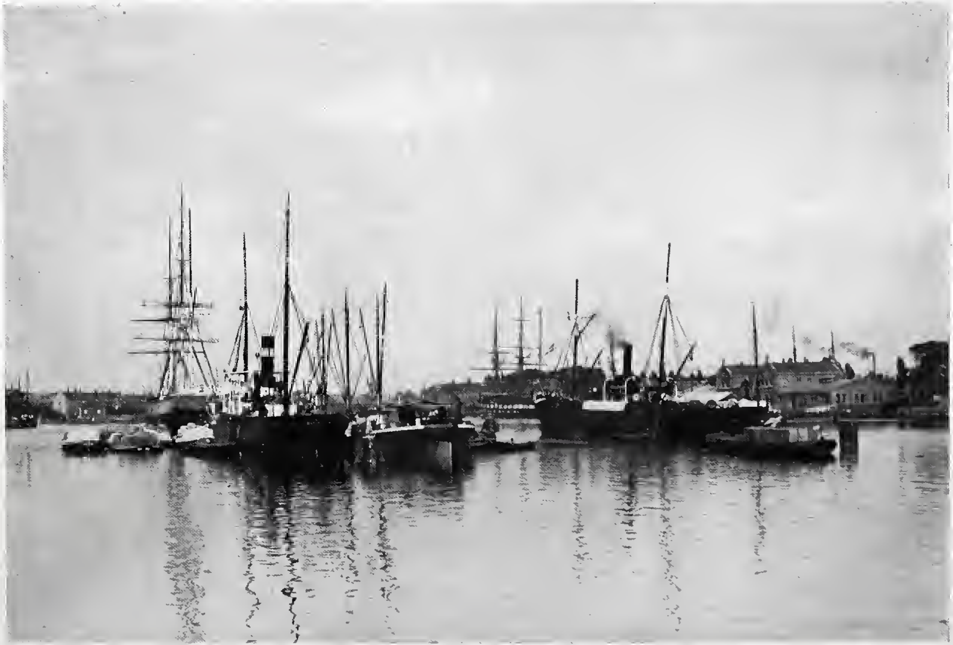

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EAST DOCK: AMSTERDAM. By L. J. R. Holst

THE PHOTO-MINIATURE

*A Magazine of Photographic Information*

Edited by John A. Tennant

Vol. I JUNE, 1899 No. 3

# HAND-CAMERA WORK.

The evolution of the camera offers material for a curiously interesting chapter in the unwritten story of photography. If we contrast the hand-camera of to-day with the clumsy instrument of less than twenty years ago, the advances made in construction seem truly remarkable. And yet if we go back to the beginning of photography, we find Niepce (1816) describing his camera as a box six inches square, with an extensible front carrying the lens. This was the first photographic camera, antedating Daguerre and his discovery some twelve or thirteen years. How closely the brief description covers the familiar "fixed-focus" box of to-day! This camera of Niepce, too, as we see it in the museum at Châlons-sur-Saône, in France, is fitted with a perfect iris diaphragm, which we fondly regard as another modern improvement. When Niepce showed his camera to the optician Chevalier, of Paris, the latter improved upon its construction by producing a portable focusing, folding camera, roughly approximating the folding hand-camera introduced a year or two ago as "new." Pushing our comparison still farther back, we see, in Fig. 1, a pre-photographic camera, copied from a sketch published by the Abbé Nollet, of Paris, 1755, which is similar in essential feat-

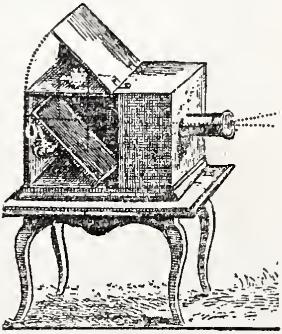


*Fig 1*

ures to the *Reflex* hand-camera among the novelties of this year of grace. These things, however, we may leave to the historian, merely noting as we pass that the hand-camera is not altogether a modern idea, and that it is in our own country that it is at once most popular and most perfect in its development.

The purpose of this little book is to supply a manual for the amateur photographer who knows nothing of photography, save from the point of view of the hand-camera. Following the lines laid down in previous numbers of THE PHOTO-MINIATURE, I will explain, very simply, the essential features of the hand-camera, its varieties, the choice of an instrument, and such information concerning its scope and use that the reader may handle his instrument with both pleasure and satisfaction. And since hand-camera work to-day is inseparably connected with apparatus and conveniences which are articles of commerce, I will freely mention such instruments and helps as are pertinent to the matter in hand, without fear of being accused of indulging in advertisement, which, as a matter of course, I desire to avoid in these pages.

The scope of the hand-camera may be definitely settled, in the beginning, as being practically unlimited. Whatever may be done with the ordinary form of camera can be done with the modern hand-camera, so infinitely varied is it in its construction, capacities, and equipment. Until within the past few years this could not be asserted with truth. Hand-cameras ten years ago were hand-cameras only, in fact as well as in name—*i.e.*, they could be used only in the hand, no provision being made for attaching them to a rigid support, nor were they fitted for other than rapid-exposure work outdoors. Their field of usefulness was, therefore, limited to the photographing of such subjects as permitted of quick exposures. To-day, however, the hand-camera is also a stand-camera ; its construction is such that it may be readily attached to any support, such as a tripod, wall, chair-back, bicycle, etc., which permits of exposures of any length of time, indoors or out. Its optical equipment also has been so improved that a wide variety of conditions (light, subject, and weather) may be met with a reasonable hope of success. Its possibilities, therefore, are bounded only by the capacities of the particular instrument employed and the skill of the person using it. There are cameras fitted to all purses, to all desires and requirements, if only one knows how and where to find them. The first thing to realize in taking up photography with a hand-camera is, therefore, that, apart from the personal factor, everything depends on the choice of the camera (including the lens) as far as what may or may not be done with it is concerned.

**Choice of a Camera.**

Unfortunately, the choice of a hand-camera is a matter about which an outsider can only offer advice of a general kind. An intelligent personal selection, only, can result in an instrument fitted to satisfy individual needs or desires. Personally, I would advise the beginner, who knows nothing of photography, to buy the simplest fixed-focus box he can find, costing from $2.50 to $10, and devote his first season to working out its possibilities and short-comings. There is no " best " hand-camera for all purposes, all instruments having limitations in this or that direction, which may be readily discovered by a little observation or experience. Before purchasing a hand-camera, therefore, think over what you desire to do with it, and keep your purpose well in mind when you go to buy. Some want a camera merely for the pleasure to be had from its occasional use as a means of recreation, summer holidays and the like. With such people the critical choice need not be grappled with until the second camera is to be purchased. The details having first consideration will be the expense and ease or convenience of manipulation. Here the " fixed-focus " box or " focusing magazine " cameras obviously meet all ordinary requirements. Others, taking up photography in a more serious way, or perhaps with some little knowledge of its methods, seek a camera in the use of which they may combine pleasure and usefulness for a definite purpose. In such a case, expense should be subordinated to the fitness of the instrument for the purpose in mind, and a " folding " or " film " camera, with suitable movements or " attachments," is indicated. Among the hundreds of varieties offered, however, competition has produced endless modifications, and it is extremely difficult to divide them into separate classes—even as far as is attempted above. Let us, then, glance at the features which are essential in all hand-cameras, and then at those which are advantageous for special purposes. In this way, perhaps, we may be able to intelligently grasp the points which will enable us to choose an instrument which will fairly satisfy our particular requirements. Let us not forget, however, that the camera is only a means to an end, and that simplicity is the greatest of all helps to successful work, in apparatus as well as methods. The ideal hand-camera, then, will be one which, while equipped with all the movements our needs require, will be so simple in its parts and manipulation that, while we work with it, we may forget the instrument and use it so unconsciously that all our attention may be given to the subject. And this, I may here say, is not merely a matter of simplicity in the instrument itself, but also of our familiarity with the apparatus and its handling.

**Essential Features.**

A hand-camera is, in its simplest form, usually a square or oblong light-tight box, with five essential parts. These are the lens, which forms and projects the picture-image upon the sensitive plate or film; an exposure shutter opening and closing near the lens, admitting light to the plate during focusing or exposure; a focusing arrangement by which the picture-image is sharply defined or focused on the plate or film; one or more view-finders, little cameras which "find" or show us exactly what will appear on the plate after exposure; and a means of carrying or changing the sensitive plates or films for or after exposure. In addition to these essentials, the better-class (more expensive) cameras have other movements or special "attachments" for special kinds of work. Some of these tend to complicate the handling of the instrument and should be avoided unless easily detachable when not needed; others should be insisted upon, and among these I may mention spirit-levels; falling and rising front, with lateral as well as vertical movement; double-swing back for all cameras for plates larger than 4 × 5 inches; a focusing scale and rack and pinion focusing device. These we will understand as we go along. The prime essential is the lens. This cannot be too good, and the better it is, the better will the work of the camera be, and the wider its usefulness.

**Fixed-focus Cameras.**

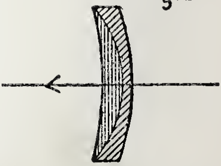
For convenience, we may broadly divide all hand-cameras into two classes, those called "fixed-focus" cameras, and those having an adjustable focusing arrangement. A "fixed-focus" camera is simply a box having the lens unalterably fixed in the front at such a distance from the plate or film that all objects from six to ten feet away from the camera to anything within the normal range of vision will be in focus on the plate when the lens is open, or during exposure. In the latest forms of "fixed-focus" cameras the lens is made removable from its mount, so that it may be cleaned, an advantage over earlier models. The lens in these cameras has also three or four diaphragms or "stops," which, as explained in *Modern Lenses* (PHOTO-MINIATURE, No. 1), increase the defining power of the lens, increase the apparent depth of focus, and even-up the illumination of the plate. Where these "stops" are numbered according as their apertures are proportionate to the focal length of the lens, instead of by arbitrary numbers, 1, 2, 3, etc., they are to be preferred, as enabling one to judge more intelligently of the exposures required by different conditions or subjects.

**Meaning of Fixed-focus.**

Inasmuch as the majority of amateurs begin their experience in photography with a hand-camera of "fixed-focus," it may be well to clearly explain what the phrase means. It is commonly known that rays of light proceeding from an object and passing through a lens form a picture-image of the object at a certain point only behind the lens. If we put a sensitive plate at that point we get a sharply focused picture of the object; if it is at any other point the picture will be more or less blurred and indistinct. This point is known as the focus of the lens, and the distance between the point and the lens itself is called the focal length of the lens. The focal length of a lens differs, of course, according to its construction, and even with the same lens the focus changes—*i.e.*, the point of focus is nearer or farther from the lens—according to the distance from the lens of the object photographed or focused upon. If we focus, for instance, a tree one hundred feet away from the camera, the distance between the lens and the plate will be small compared with the distance between plate and lens when we focus on another tree only ten feet away. With the lenses used in hand-cameras for plates smaller than 4 × 5 inches, the change of position of plate required in focusing near and distant objects is so small as to be hardly appreciable. Moreover, if we focus such a lens on an object, let us say, twenty-five feet away from the camera, we find that by inserting a smaller stop, we can bring into fairly sharp focus objects ten or fifty feet away. Taking advantage of these details, manufacturers of such cameras fix the lens at such a distance from the plate that all objects from six or ten feet away will be fairly focused. A "fixed-focus" camera, for this reason, cannot be used to photograph anything less than six feet away and, even at this distance, a fairly small stop must be used to get a "sharp" picture-image. Latterly, however, there have been introduced supplementary lenses, sometimes called "magnifiers," "portrait attachments," or "enlarging lenses," by means of which a fixed-focus camera may be employed for photographing objects to within three feet from the camera. In this way a larger image is obtained, and cameras with an "attachment" of this sort are more useful than those without it.

From this we see that the "fixed-focus" camera has definite limitations, and that the phrase "fixed-focus" is altogether different in meaning from "universal focus" (sometimes erroneously used in its place)—a quality not possessed by any lens known. Outside of this limitation the "fixed-focus" box is a very useful instrument, and by all odds the best first camera for the beginner who knows nothing of photography and is without definite purpose in his work. With such an instrument one may secure very pleasing pictures, landscapes, seascapes, out-door life, groups, small figures out-doors, etc., when the light is fairly good or we have sunlight. The "fixed-focus" feature obviates all fear that the picture will not be in focus on the plate, and the camera is always ready for instant use when loaded with plates or films. It should not be forgotten, however, that the low price of these cameras preclude anything more than an ordinary single lens of small size, the aperture of which can rarely exceed *f*/ 20 or *f*/16, which means that time-exposures with the camera held in the hand, or exposures in dull weather, are hardly possible, and that its usefulness is restricted to out-door scenes with sunlight or abundant illumination. The lenses used in fixed-focus cameras are generally what is known as an achromatic meniscus, as seen in Fig. 2. This is a lens

Fig 2



formed by cementing pieces of "crown" and "flint" glass together so that one corrects certain defects of the other. With such lenses, since they are not "rectilinear"—*i.e.*, capable of rendering straight lines as such—care should be taken not to include anything in a view which will bring straight lines to the edges of the scene, or they will appear curved in the negative. All this, with many other lens facts, too numerous to repeat here, may be found explained in *Modern Lenses*, to which the reader is referred.

The most profitable thing to do after purchasing a fixed-focus camera is to spend an hour or two in going over its various motions, as if one were actually using it, and "wasting" a few plates to verify one's notions about its performance as gleaned from the manufacturer's book of instructions. Go over the points again and again until they are familiarized; find the object with the "finder," give exposures of varying length, remove the camera-back and, looking through the lens from behind, observe the difference in amount of illumination as the stops are changed. The more familiar we are with the instrument, the surer may we be that failure in the field will not be our fault.

**Varieties of Fixed-focus Cameras.**

The improvements in "fixed-focus" cameras during the past year or two chiefly concern the carrying or changing of the plates or films used; the introduction of devices permitting one to use plates, cut films or "cartridge films" at will in the same camera; and the addition of special "attachments" for branches of work not hitherto regarded as within the scope of hand-cameras. The aim of the manufacturer, as a matter of business, is to enlarge the general usefulness of his cameras and make their manipulation as simple as is possible. Especially has he endeavored, this year, to enable the amateur to dispense with the difficulty of securing a dark-room when desiring to re-load his camera, and to provide means whereby the traveller may carry sufficient plates or films in his camera for the needs of more than a single day. The 1899 models are, of course, lighter and more compact than earlier forms, either from the use of aluminum in their construction, as in the No. 2 *Folding Pocket* and *Bull's-eye Kodaks*, or by making the camera-body collapsible, as in the *Monroe* and *Kozy* models.

Two or three years ago one had to determine, before buying a hand-camera, whether plates or films were to be used—a difficult question to answer even yet. Now, however, even "fixed-focus" cameras may be had, such as the No. 2 *Eureka*, *Ray* E or *Ray* C, the *Vives*, the *Adlake*, and others in which either films or plates may be used at one's convenience—a big advantage. Another improvement is the adoption of the "magazine" feature. This is a device by means of which a number of plates or cut films may be carried inside the camera itself, arranged ready for exposure. As each plate is exposed the turn of a lever or other simple movement releases it from its position and carries it out of the field of view, at the same time bringing another (unexposed) plate into position ready for use. So perfect are the fittings of these "magazines" that in more than one instrument of the sort it is possible when needed to expose twelve plates, one after the other, in ten seconds. In the *Adlake*, *Cyclone*, and *Ray* cameras this magazine consists of metal or aluminum light-proof holders of extremely fine construction, which permit one to load or unload the camera in daylight. The *Adlake Repeater* has an automatic-exposure counting-device, as part of its magazine, which indicates the number of exposures made, and a locking arrangement which prevents the release of more than one plate at one time. This instrument also has portrait and panoramic attachments, two features not hitherto obtainable in "fixed-focus" cameras. The 1899 *Vives* No. 2 and No. 6 are exceptional in their class by their capacity for carrying and changing 36 glass plates or 100 cut films before it is necessary to reload. Single exposed films, or any desired number, may, of course, be withdrawn for development from any of these magazine cameras without disturbing the unexposed plates.

The *Dayplate* camera must also be mentioned as a clever attempt to supply a means of changing plates without a dark-room. The set of twelve plates supplied for this camera are previously mounted on a long strip of black paper, and packed in a pasteboard box with projecting strip. By inserting this in the camera and attaching the projecting strip to an empty wooden reel inside the camera, a turn of a key withdraws a plate, ready for exposure, from the package, and, after exposure, another turn of the key winds the plate onto the reel, bringing a new plate forward for the second exposure. When all

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A GROUP OF CATBOATS

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A RAP FULL (Three-Masted Schooner)

the plates have been exposed the extra length of black paper is wound around the exposed plates on the reel, and the latter may be removed in daylight with perfect safety. Another empty reel is inserted, with a second package of plates—still in daylight—and one is provided for another dozen exposures.

**Cartridge Films.** Where extreme portability and simplicity of exposure combined with a ready means of changing after exposure are desired, the *Folding Pocket Kodak* and No. 2 *Bull's-eye Kodak* mark the greatest improvement in "fixed-focus" cameras built on the "cartridge" system. They are made of aluminum and weigh less than 16 ounces apiece. The "cartridge system" seems destined to play an important part in photography from this time on, hence a few words of explanation may be useful to the reader unacquainted with it. A "cartridge film," sometimes called a "Roller Film" or "Daylight Film," is simply a band of thin gelatine or celluloid coated with the usual sensitive emulsion. A length of film sufficient for twelve exposures is backed with a strip of black paper (loose) which extends several inches beyond each end of the film. These are wound about a wooden spool so as to form a light-proof cartridge film. These cartridge films are easily inserted in the camera, or in the "Roll Holder" constructed for use with cameras primarily intended for glass plates. When inserted the loose end of the black protecting paper is threaded up and reeled off sufficiently to pull the sensitive film into its position in the focal plane of the lens. On the black paper the various sections of film corresponding in size to the picture to be made are marked in white figures, and as these figures, 1, 2, 3, etc., appear at the little red window in the back of the camera they indicate which section of the film is before the lens ready for exposure. When the whole band of film has been exposed the extra length of black paper is wound about the spool, completely protecting the exposed film and permitting its removal from the camera in daylight. Another cartridge film may be inserted, still in daylight, and the work of picture-making proceed as before. The advantages of this system are apparent, viz.: the extreme lightness of the negative films compared with glass plates when travelling, films weighing ounces where loaded plate-holders weigh pounds; the fact that films are non-breakable, may be carried in the pocket without the slighest inconvenience, or sent by mail if new supplies are needed; the avoidance of halation, inevitable with the ordinary glass plate in photographing against the light, indoors or out; and the convenience of being able to load or unload one's camera in daylight. Against these advantages must be set the hard facts that cartridge films are more difficult to develop (more troublesome) than plates, somewhat inconvenient to handle in printing, etc., because of their extreme thinness and inclination to curl, and their slightly higher price over plates. That these are not serious disadvantages we will see when we treat of the manipulation of such films.

**Cut Films.** It may be said here that, generally, wherever glass plates may be used, cut films may be substituted if desired. Cut films are pieces of celluloid, or similar substances, about $\frac{1}{100}$th of an inch in thickness, and made in the usual plate sizes. They are coated with the same emulsion as is used for plates, and may be handled in precisely the same way as plates. When used in the ordinary plate-holder it may be that each film will need to be backed with a piece of black card to make its sensitive surface occupy the plane which the surface of the thicker glass plate ordinarily occupies, or a simple "cut-film" holder may be inserted in the plate-holder. This is a piece of thin metal with two or three of its edges slightly turned over, forming a nest for the cut film and keeping it flat during exposure. With such extra holders, of course, the advantage of lightness of weight is lost.

**Keeping Quality of Films.** A word or two about the keeping qualities of films *versus* plates may not be out of place here. It is commonly supposed that sensitive films are apt to lose their sensitiveness if kept for a long period before exposure, or that the negative image may fade if a long interval passes between exposure and development. These things *did* happen when the manufacture of cut and roller film was in its infancy. Now-a-days, however, there need be no fear of this. It has been shown repeatedly that films retain their sensitiveness and their images unimpaired for over five years in varying climates, and that the length of time elapsing between manufacture and exposure or development is of no importance. It need not be said, however, that the use of freshly sensitized film and speedy development after exposure are to be followed as far as convenience may permit.

**Adjustable-focus and Folding Camera.**

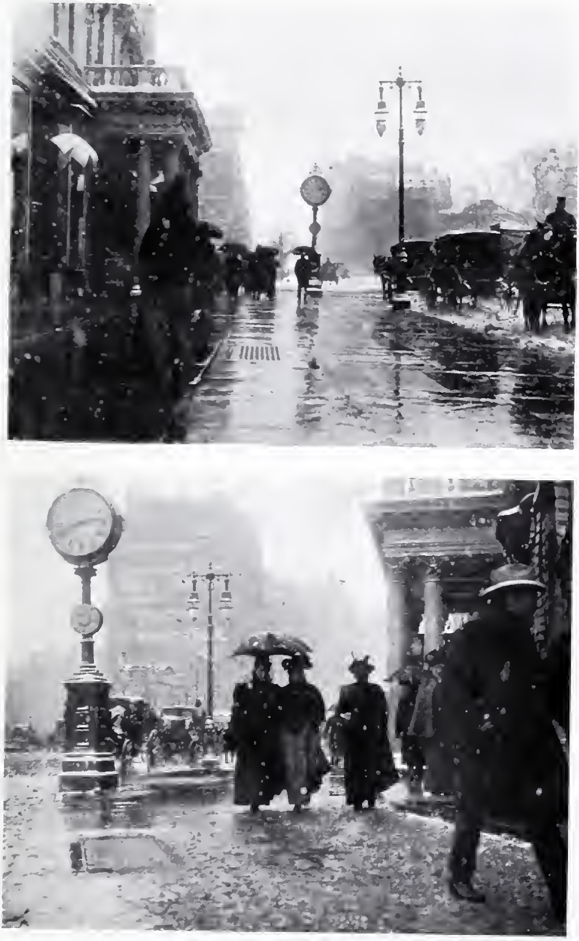
We can now take up the other class of hand-cameras, viz., those fitted with an adjustable-focusing arrangement. Save in the simplest essentials, these are altogether different from the " fixed-focus " camera, and are practically the ordinary view-camera with which we are familiar, but more compactly constructed and enclosed in a box. In its cheaper forms the " adjustable-focus " hand-camera is merely a box, and the focusing arrangement is a simple device by which the lens, instead of being fixed to the front of the box, is attached to a sliding front within the camera. This sliding front carrying the lens is fixed to a knob projecting at the side of the camera, where the instrument is fitted with a ground-glass for hand-focusing, and by pushing the knob along in its slot the lens is moved to and from the plate until the object to be photographed is sharply focused on the ground-glass at the back of the box. In instruments such as the *Vive* No. 6, where the magazine feature does not permit of a ground-glass, the relative positions of the lens when objects at certain distances are in focus are marked on a small scale attached to the side of the camera. Alongside this scale is a slot in which a lever moves, attached to the sliding lens-front inside the camera. When the object to be photographed is just beyond, let us say, fifteen feet away from the camera, the lever is set at the point marked 15 on the scale, and the object is then sharply focused on the plate. This is called focusing by scale, and the method is adopted in most hand-cameras, whether provided with a ground-glass or not, as the simplest and quickest way of obtaining a focus. The No. 4 *Eureka*, the Nos. 4 and 5 *Cartridge Kodaks*, the *Ray* D, the *Vive* No. 6, and the *Montauk Junior* 4 × 5 are instruments of this description.

**Portability.**

Let us now examine a "folding" adjustable-focus hand-camera and we will perceive the differences between this form and the "fixed-focus" camera more plainly. Outwardly there is little difference except its smaller thickness. The smallest " fixed-focus " camera for 4 × 5 plates now in the market measures 5 × 5⅜ × 9⅜ inches, while the smallest folding adjustable-focus camera for the same size plate measures 5½ × 6 × 1¾ inches. This reduction in bulk, which is accomplished by giving the camera a folding bellows instead of a rigid body, is very advantageous for cyclists and tourists.

**Focusing Screen and Swing-back.** On two sides of the box we see screw sockets, by which the camera may be attached to a tripod or other support. At the back edge of the top we see a little elevation in the leather covering of the camera. We press this and a spring-actuated panel raises itself, forming a shade at the back of the box; underneath we find a piece of ground-glass, set like a window in the end of the camera. This is the focusing screen and is generally identical in size with the plate for which the camera is intended. Closing this panel, we insert a finger-tip in an incision running across the top of the focusing screen and gently push it back. Thus we make room for our plate- or roll-holder, the back being so constructed that when the holder is placed in this position, the surface of the sensitive plate or film is exactly where the surface of the ground-glass was, and the picture focused sharp on the one will be equally sharp on the other. We next pull at the right-hand side of the camera-case, first releasing the catch, and it opens like a door. It is now seen that the back framework of the camera moves on a pivot placed at its centre top and bottom, so that we can swing the back (containing our plate-holder) almost an inch nearer to the lens at either side than it occupied in its normal position. Releasing the pivot pins at top and bottom, we insert them in places provided at the centre of each side of the back, and can now swing the back vertically in or out as desired. These movements constitute what is known as the "double swing," and the purpose of the "swing" is to keep the plate always absolutely perpendicular when the camera is tilted to include the top of a high building, or more of a subject than can be had with the camera in its normal position. A "swing" is rarely needed in cameras for plates less than 5 × 7 inches. The swing movement is not by any means an essential feature for strictly hand-camera work and, personally, I have found it more bother than it is worth, save in exceptional cases, and then it is very useful—as in architectural work.

**The Folding Front and Focusing Scale.** Closing the whole of the back of our camera, we press the little elevation at front edge of the top of the box, and the front falls upon its hinges until it is at right angles to the body of the camera, where it locks itself rigidly. Thus it forms a base-board, and across it



A SNOWY DAY ON FIFTH AVENUE

*(a) Looking North* *(b) Looking South*

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By Pach Bros.

from back to front edge runs a brass guide along which the lens travels when we focus on an object. At the left-hand side of this brass guide we see an ivory tablet, on which numbered lines are marked. This is a focusing scale, and the numbers represent feet. If we now pull the front board of the camera proper forward, it travels along the brass guideway, and we can fix it at any desired spot by touching a screw-head or cam on the base of the front. At the left side of the lens-board we see a pointer which passes over the focusing scale. If we fix the lens-board so that this pointer is over the mark numbered 15 on the scale, this tells us that all objects more than fifteen feet from the camera will be focused on the plate with the lens in its present position. In this way we can focus any object without looking at the ground-glass, a great convenience when working with the camera in the hands. It is important to test this focusing scale and ascertain whether it is correctly adjusted to the lens on your camera. This may be done very simply by taking the camera out-doors and fixing a boldly printed card (inserted in a cleft at the top of the stick) at stated distances from the camera as marked on the scale. Fixing the card at, say, six feet away, carefully focus the camera until the printed letters are absolutely sharp on the ground-glass, using a magnifier to examine the ground-glass image if you have one handy. If the scale is correctly marked, the pointer on the front board will be exactly over the line marked 6 on the scale. Now test the other distances as they come on the scale by repeating this operation. A scale incorrectly marked may be adjusted in this way, or a new scale made if this is desirable.

**Estimating Distances.**

Those who find any difficulty in estimating the distance of any object with the eye alone, and hence do not set the camera at the right point on the scale to secure a sharp focus, should measure out various distances and pace each one several times until measurement by pacing can be done correctly, or, where the focal length of the lens is known (as it always should be) a fairly correct estimate of the nearest distance at which objects are in focus may be had by dividing the square of the focal length by one-tenth of the intensity ratio of the diaphragm used. Thus, if the focal length of the lens is seven inches, and the aperture of the diaphragm used is *f*/7.7

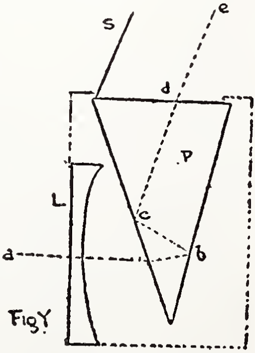
(49 ÷ 7.7 = 61.25) all objects beyond 62 feet will be in focus. A still simpler way is to have a *Telemeter*, such as the *Ideal*, *Adams*, or "*N. & G.*," which tells the distance away of any object at a glance. It is important, however, to learn to estimate distances with the eye as early as possible because the difference in camera extension is sometimes considerable even with small cameras. Thus, using a 3¼ × 4¼ inch plate with a six-inch lens, the difference in focal extension between one hundred feet and four feet is about one inch. The distance (or amount of extension) between plate and lens also increases very rapidly as the distance between the lens and object decreases, as may be seen by noting how the lines on the focusing scale are separated in the lower numbers. Thus, while the difference in extension when focusing objects at one hundred and at fifty feet is only one-eighth of an inch (with a six-inch lens), the difference between a sharp focus at fifteen feet and one at eight feet is fully half an inch.

On page 14 of *Modern Lenses* is given Dr. Higgins's table of distances at and beyond which all objects are in focus, calculated for lenses of varying focal length and different diaphragms. Sir David Salomons' table, here given, supplements that made by Dr. Higgins.

SALOMONS' TABLE OF DISTANCES, AT AND BEYOND WHICH ALL OBJECTS ARE IN FOCUS.

| FOCUS OF LENS IN INCHES. | RATIOS MARKED ON STOPS. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | f/7 | f/8 | f/9 | f/10 | f/11 | f/12 | f/13 | f/14 | f/15 | f/16 | f/17 | f/18 | f/19 | f/20 |
| | Number of feet after which all is in focus. | | | | | | | | | | | | | |
| 4..... | 19 | 17 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 9 | 8 | 8 | 7 | 7 |
| 4¼... | 21 | 19 | 17 | 15 | 14 | 12 | 11 | 11 | 10 | 10 | 9 | 9 | 8 | 7 |
| 4½... | 25 | 22 | 19 | 17 | 16 | 15 | 13 | 13 | 12 | 11 | 10 | 10 | 9 | 9 |
| 4¾... | 27 | 23 | 21 | 19 | 18 | 16 | 15 | 14 | 13 | 12 | 12 | 11 | 10 | 10 |
| 5..... | 30 | 27 | 24 | 21 | 19 | 18 | 17 | 15 | 14 | 14 | 13 | 12 | 11 | 10 |
| 5¼... | 33 | 29 | 25 | 23 | 21 | 20 | 18 | 17 | 16 | 15 | 14 | 13 | 13 | 12 |
| 5½... | 37 | 31 | 29 | 26 | 23 | 22 | 20 | 19 | 17 | 16 | 15 | 15 | 14 | 13 |
| 5¾... | 39 | 34 | 31 | 28 | 26 | 24 | 22 | 20 | 18 | 18 | 17 | 16 | 15 | 14 |
| 6..... | 43 | 38 | 33 | 31 | 28 | 26 | 24 | 22 | 21 | 20 | 18 | 17 | 16 | 15 |
| 6¼... | 47 | 41 | 37 | 33 | 30 | 28 | 26 | 24 | 22 | 20 | 20 | 19 | 18 | 17 |
| 6½... | 50 | 45 | 40 | 36 | 33 | 29 | 28 | 26 | 24 | 23 | 21 | 20 | 19 | 18 |
| 6¾... | 55 | 48 | 43 | 39 | 36 | 32 | 30 | 28 | 25 | 24 | 22 | 22 | 21 | 20 |
| 7..... | 58 | 52 | 45 | 42 | 38 | 35 | 31 | 30 | 28 | 26 | 25 | 23 | 22 | 21 |

**View-finders.** At the right-hand side of the lens, often fixed to the upright carrying the lens-board, will be found a little square box with a small lens at the front and a ground-glass lid often shielded with a metal hood. This is the view-finder, commonly accepted as an essential feature of all hand-cameras, but differing considerably in form. It is a miniature camera, and its purpose is to show a reduced but true fac-simile of what will be included in the negative after exposure and development. Whether it does so or not depends upon whether it has been properly adjusted so as to be in agreement with the lens used on the camera. Oftentimes this adjustment is carelessly done, and the worker finds, to his disappointment, that his negative does not show all that he saw on the finder. It is especially important that the finder shall be true when one is photographing subjects with motion, for here we depend upon the finder to tell us the position of the object at the moment of exposure. The commonest form of finder is a box about 1¼ inches square, with a small double-convex lens fixed in front, a mirror behind, placed at an angle of 45° and a piece of ground glass above. The picture-image is projected upon the mirror horizontally by the lens, and vertically reflected to the ground-glass by the mirror. This form is serviceable, but the image lacks brilliancy. Another form is a double-concave lens, cut to be in proportion to the size of the plate used, and mounted on the top of the camera-box (not practical with folding cameras). An excellent finder introduced last year is of the usual box form and has a double-concave lens cut square occupying the whole of the front side. Behind is a mirror at an angle of 45°, and this reflects the view through a second double-concave lens which forms the lid of the box. On the surface of this lens a small steel ball rolls freely, and the combination of level and finder so formed is protected by a thin cover-glass. This makes an unusually brilliant

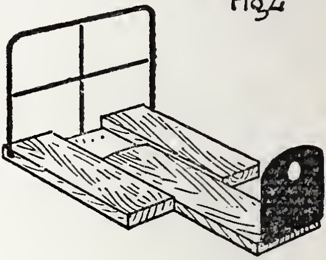


FigY

finder, needing no hood even in sunlight, and giving a direct non-inverted picture visible at any angle. The design is patented. The most perfect among these small separate finders, however, is undoubtedly the *Iconoscope* (image-viewer) of the Bausch & Lomb Opt. Co., which gives a brilliant image, sharply defined, non-inverted and not reversed. It consists of a negative lens L, shown in the Fig. Y, a prism P, and a black screen S or hood. The passage of a ray of light to the eye is seen by the dotted lines *a b c d e*. The dotted lines X, $X^1$, $X^2$ indicate the metal case enclosing the optical system. The eye, of course, is in the direction *e*, *d*.

In place of a reflecting finder such as is outlined above, some workers prefer a simple form of view-metre, similar to that shown in Fig. Z. This consists merely of a small wire-frame, about 2 × 1¾ inches, fixed on the top of the camera, with a sight-hole at about three inches behind it, through which aim is taken by holding the camera up to the chin. If the sight-hole is made to slide in a groove, the angle of view can be adjusted to suit any desired lens. The finder can either be made a fixture on the camera, folding flat when not in use, in which case no base-board is required, or it can be made complete in itself for use on different cameras.

Fig Z.



**Reflecting and Twin-lens Cameras.**

Better than all these, as will be readily understood, is a full-size finder (size of the plate used) placed at the top of the camera and so giving an absolutely identical image of all reaching the plate up to the very moment of exposure. This form of finder, however, is not possible with a folding camera, requiring the box-form for its operation. A twin-lens camera may be cited as an instrument equipped in this way most satisfactorily; in such an instrument we have two cameras, one above the other, each fitted with a lens of the same construction as its fellow, accurately paired. The upper camera is used only as a finder, the picture being reflected so as to appear on a ground-glass panel in the top of the camera. The lower division is the exposure camera fitted for plates or films as the case may be. The *Ross Twin Lens* camera is perhaps the best-known instrument of this class, although in this country the *Twin Lens Montauk* is the more popular instrument. The *Reflex* camera recently introduced here combines the advantages of a twin lens camera in a more portable and less expensive way than is outlined above. In this instrument only one lens is required: the image is received upon a mirror swinging at an angle between the lens and plate and projected to the full-size finder let into the top of the camera. At the moment of exposure the operation of the shutter draws the mirror up to the top of the box, out of the field of view, permitting of the exposure of the plate in the usual way. The construction of this camera is very ingenious and its special features mark a decided advance in hand-camera construction for the higher grades of work. For the photography of rapidly moving objects, or for out-door work where composition is aimed for in making the picture, these full-size finder cameras are invaluable.

**Testing the Finder.** With any form of camera other than the twin-lens or reflex varieties, one of the first things to be done in the way of getting acquainted with the instrument is to test the view-finder and see how far its image coincides with that given on the negative. To test the finder is not a difficult matter, and if the camera is set up in a certain fixed position, and a view or object taken and then developed, you have a correct copy before you of what the camera will give you from *that* position. Now take and compare the results obtained with the finder, and note if there is any difference. It is usual to find more on the finder than on the plate, and if this be so the difference between the two images should be blacked out on the finder with black varnish or strips of paper; this done, you will have something that can be relied upon at all times.

**Angle of View.** For much of the work done out-doors there is often not time to consult the finder to ascertain first what will be included in the picture-field. For this reason it is well to accustom one's self to "finding" with the eye alone.

This is a matter of practice and experience, but is a very useful help when acquired and worth cultivation. The angle of view embraced by a lens is determined by its focal length and the relation of this to the base-line of the plate used. A careful study of Dr. Woodman's *Angle of View Table*, given in *Modern Lenses*, will familiarize the worker with this detail, and the knowledge once gained and made instantly available by observation in the field will be of great help in the use of the camera.

**Rising and Falling Front.** The front-board carrying the lens and shutter—set between two wooden or metal uprights—now demands a few words. It is important that this part of the camera should be movable vertically and horizontally. When so constructed it is called a rising and falling front. The lateral movement, from side to side, is for use when the camera is used for making a view upright instead of horizontally on the plate. The purpose of the rising and falling front is to shift the lens from its normal position at the centre of the sensitive plate or film to a higher or lower position in order to include more or less foreground than can be had with the lens in normal position. It is also very helpful in securing the upper part of a high building which would not be covered by the lens when fixed at the centre of the plate. A very useful addition to the rising and falling front, suggested by F. Dundas Todd, would be a scale attached to the upright carrying the rising front and showing at what distance the lens will cut the foreground when the camera is held level, as in photographing street scenes.

**Lenses.** We now come to the lens and exposure shutter — the two most important parts of the hand-camera equipment. As far as the lens is concerned, the requirements are speed, covering capacity, "depth of focus," and as large an angular field as is consistent with correct perspective. Necessarily, hand-camera lenses have to be compact in form and mounting, and for this reason several lenses, normally too bulky for this purpose, are obtainable in special form with a shutter as part of their make-up for hand-camera work only.

The cheaper forms of folding cameras are, as a rule, fitted with single landscape lenses of excellent quality, but limited in speed and general capacity. Good work may be done with these instruments, of which the *Ascot*, No. 1, the *Pony Premo E*, the *Ray Folding*, Series I., the *Montauk*, IIB., may be mentioned as examples, but their limitations should be well understood, subjects requiring rectilinearity, for instance, not falling within the scope of their single achromatic lenses, and a fairly bright day being essential for instantaneous work with them. The lenses of these cameras work at *f*/16 or *f*/20, and as one-tenth of a second is about as long an exposure as may be given with the camera in the hand (and even this can be done only with practice), it will be seen that good general illumination of a view is essential to success with lenses of this low intensity. Cameras equipped with rapid rectilinear (or symmetrical) lenses are, of course, more generally useful, embracing a wider variety of subjects and being less limited as to working conditions. With a lens of this kind, working at *f*/8, one can attempt all subjects which are fairly lighted, even without sunlight, except those including rapid movement. Of the new instruments fitted with rectilinears there is a great variety, but the *Folding Cartridge Kodaks* Nos. 4 and 5, the *Korona* Series, *Montauk*, Series I., the *Ray*, Series II., the *Solograph*, the *Ascots*, Nos. 9, 10, and 13, may be spoken of as including all desirable features and especially well fitted as far as the lens is concerned.

**Anastigmats.** The chief desire of the hand-camerist who is in earnest about results is, however, to be able to grapple with whatever subject may present itself, regardless of conditions, hence the wisdom of securing in the first place the best possible lens, even if something has to be sacrificed in the finish or equipment of the camera to attain this. For this reason I strongly advise the hand-camerist to equip his camera, as soon as possible, with one of the modern anastigmats, such as the Zeiss *Planar*, No. 11 (6¼ inches focus, for 4 × 5 plates), or the *Goerz*, Series III., No. 1 (6 inches focus); or the *Collinear*, Series II., No. 3 (5⅞ inches focus); or the *Turner-Reich Anastigmat*, all adaptable for the folding hand-camera, and working at apertures ranging from *f*/3.6 to *f*/7.7, which put an enormous power into the hands of the worker. With such a lens as any of these, and a good knowledge of its capabilities, one is master of the situation, equal to any subject which may present itself, and independent of weather or light or movement. These lenses meet all the ideal requirements of instantaneous work or general photography at all times of the year, embracing an angle of 70° with full aperture, have remarkable defining and illuminating power, and possess a flat field with great rapidity.

**Experiments.** In beginning hand-camera work it is as well to accept the lens fitted to the camera purchased and to get as full a special knowledge of its capabilities and shortcomings as possible by experience. This will enable you to choose a better instrument more intelligently than any instructions can do. In this detail it may be said that if hand-camerists would do more experimental work, not needing the exposure of plates as a rule, with their cameras the average results in actual work would be much better than they are. When you have a few spare minutes, get out your camera, and examine it again and again, focus it on objects at varying distances, compare the finder-image with that on the ground-glass, or the definition of the picture obtained with focusing by scale with that obtained by careful focusing on the ground-glass. Observe what happens when the stops in the lens are changed; how sharpness of definition is secured at the expense of illumination and consequent loss of speed. Use the rising and falling front and see how the lens behaves under the altered conditions, whether it covers at the corners where the front is raised to its extreme height, using a plate to observe this more closely. In other words, make yourself as familiar as possible with all the movements of your instrument, but especially with the lens and shutter, upon which, in nine out of ten instances, your success will depend.

**Exposure Shutters.** In exposure shutters for hand-camera work we want time and "instantaneous" movements as follows: *time*, a means of exposing the plate for as long a period as may be necessary; *intermediate* or "bulb," a movement in which the shutter remains open just as long as the finger holds the release or we retain pressure on the rubber bulb; *instantaneous*, a manifold movement permitting of exposures of from $\frac{1}{4}$th to $\frac{1}{100}$th of a second at will. In some hand-cameras the shutter is equipped to give time and three different "instantaneous" exposures, sufficient for ordinary needs and covering the capacity of the lens with which they are used. In other cameras a more elaborate mechanism is provided which works between the combinations of the doublet lens, and is known as a diaphragm shutter—usually found on cameras listed at over $12. These shutters are extremely varied in their movements and adjustment, but are simple in manipulation when once the manufacturers' directions for use are thoroughly understood. Of these shutters the Bausch Lomb *Diaphragm Shutter*, the *Unicum*, the Gundlach *Korona*, the Goerz *Sector*, and the *Ray* are notable examples. The writer has had experience with all save the last two, and has found them equal to all claimed for them. Of other "between the lens" shutters of high efficiency may be mentioned the *Kazoo*, the *Prosch*, and the *Celeritas*. The roller-blind exposure shutters, of which the *Thornton-Pickard* is perhaps the most popular, work in front or behind the lens; by their form they are hardly as convenient for folding-cameras as the diaphragm or "between the lens" variety, but apart from this they are extremely simple and efficient for time and instantaneous work, with the advantage that a single shutter may be used for several lenses or the shutter may be removed at will. With diaphragm shutters permanently attached to lenses, if the shutter is injured in any way, the lens is rendered useless until the former is repaired, which is somewhat awkward when the instrument has to be sent to a distant factory for repairs.

Where choice among shutters is possible—*i.e.*, when buying a shutter separate from the camera, to be fitted to the lens—it should preferably be of the "everset" variety; that is, one which when released exposes the plate and then sets itself for the next exposure. Next to this, a shutter which may be set while the plate is ready for exposure, without admitting light to the camera, should have preference over other varieties.

For all subjects except those including extremely rapid movement, the diaphragm or roller-blind shutters will be found to answer all requirements; for subjects with rapid movement, such as flying birds, men leaping or jumping, the finish of a race, etc., what is known as a "focal-plane" shutter is generally used. This is not described because those who use such shutters are beyond the scope of this little book.

If now we see that our camera has a flat, circular spirit-level attached to the top of the swing-back, or on the camera itself, and a rack and pinion arrangement for gradually focusing the picture-image, attached to the lens-front, we will be equipped for work. Whether the camera is fitted for plates only, or plates and cut films, or plates and "cartridge" films, must be left to individual choice, the advantages of each system being now well understood. Among the folding cameras of the year a majority are adapted for either plates or "cartridge" films, the *Ascot* Series being particularly noteworthy for this feature, and the Eastman *Cartridge Kodaks* Nos. 4 and 5. A special feature in hand-cameras of the past year or two, not previously mentioned, is a style permitting of the use of long-focus lenses. These are called "Long-Focus Cameras," have a bellows extension of about 15 inches for the 4 × 5 inch size, and 22 inches for the 5 × 7 inch size, and are made for use with plates, cut films, and roller films as in other varieties. The advantages of these cameras will be obvious to those familiar with the results obtained with long-focus as compared with short-focus lenses, and they are especially useful in obtaining large images of distant views, as well as in copying and enlarging. They are, however, more suitable for the advanced worker than the average hand-camerist, and hence need not be referred to further here. The panoramic hand-camera, for making panoramic pictures, is another special variety which does not call for particular description here.

**Tripods.**

A light but rigid tripod will, of course, be necessary when the camera is to be used for time-exposures or indoors. This should be as compact in form as is compatible with its rigidity when extended, and should have a standard screw fixed to its head so that the screw cannot be lost. The wood of which this tripod is made should be tough and long-grained rather than a wood short in the grain, like mahogany, for instance. A mahogany tripod easily snaps in the field and is troublesome. The tops of the legs where they are fixed to the head should be preferably capped with brass to strengthen them. The *Premo* tripod is perhaps the most compact and portable of its kind, but is high-priced; the *Brighton* is a cheaper and equally serviceable model, although not so compact. For use with a bicycle, or for clamping the camera to a fence, or chair-back, a *bicycle clamp* is the usual device used, and may be carried in the pocket.

**Knowing Your Camera.**

Now I must repeat that, whatever make of camera is purchased, the worker should thoroughly familiarize himself with its various movements and working by experiment and practice before taking it out into the field. The time devoted to this will save many failures and disappointments. Especially should attention be given to the lens and shutter, so that their adjustment in actual work may be done quickly and with perfect ease. With regard to the lens, make sure of your knowledge of the relation of the diaphragms to its focal length and their influence upon the illumination and definition of the plate under varying conditions. Learn, too, the differences resulting from exposures of varying length; expose three plates on the same subject, one after the other, at the same distance, give one $\frac{1}{10}$th second, another $\frac{1}{25}$th second, and the third $\frac{1}{100}$th second exposure. Develop the plates altogether with the same solution and compare the negatives. Take a fourth plate and, setting the shutter at "time," pull out the slide of the holder one-third of its extent, and give an exposure (on a subject well shaded) of one second; now pull the slide out two-thirds of its extent, and expose again for one second; pull the slide wholly out, and give the plate a second's exposure. Your plate has now three bands, one of which has had three seconds' exposure, another two seconds, and the third one second. Develop the plate in a normal developer and observe the differences in the three portions. In a similar way the difference in results, when the lens front-board is in its normal position or otherwise, may be studied with after profit. If the camera is fitted for cartridge films the roll or spool holder should be carefully studied (if loaded, do this in a dark room), so that its loading, unloading, and action may be clearly understood.

**Blue Spectacles.**

Another difficulty peculiar to the beginnings of amateur photography is the estimation of the photographic value of the many colors, blue sky, green foliage, and vari-colored buildings which compose so many scenes such as the hand-camerist attempts to photograph. A pair of blue spectacles to be worn when selecting an outdoor view will overcome this difficulty, and enable the beginner to see the scene about as it will appear in his photograph. It is astonishing to observe how many a scene attractive to the eye, because of its color, loses its peculiar charm when viewed in this way. Another plan, equally effective, is to place a piece of blue glass (not too heavily tinted) before the lens when focusing on the ground-glass, so that the view is seen without color. The rim of a lens-cover fastened to a suitable piece of blue glass offers a ready means of making a helper of the sort mentioned.

**How to Hold the Camera.** We will now suppose that the reader has chosen his hand-camera and is fairly familiar with its movements and handling. He is anxious to gain experience with it in actual work outdoors. What is the first thing to be done? First, he must learn how to hold the camera during the exposure of the plate in such a way that he can expose without communicating movement to it, which would necessarily give a blurred or "moved" negative, altogether useless. To hold the camera in the hand, watch the finder and level, keep an eye on the subject and release the exposure shutter is, to the beginner, a somewhat difficult matter. For this reason many plates are spoiled at first, because of involuntary movement of the body at the moment of exposure. A good plan is to practice with a small glass partly filled with water placed on the camera, going through all the motions of exposure, and watching the water as the exposure release is touched. Of course, in a very rapid exposure, vibration of the camera or shutter which takes place after the actual exposure is ended has no effect upon the plate, but the slightest movement during the time the lens is open will inevitably produce a double image. A long strap, fitted about the camera-box, and long enough to go easily over the shoulders, will be found very useful in helping to steady the apparatus in the hand. When confidence and experience are gained this may be dispensed with, giving greater freedom. Now with regard to holding the hand-camera there is a diversity of opinion, every worker adopting the position which experience teaches him has given the best results. It is generally agreed, however, that for near objects the camera should be held fairly low to include desirable foreground, or to avoid looking down upon the figure where an outdoor portrait is attempted; conversely, when distant objects are being photographed, the camera should be held as high as one conveniently can to cut off uninteresting foreground, and to give as near a view as that seen by the eye as is possible. For ordinary subjects it is usual to hold it against the breast, as high as is compatible with one's ability to watch the finder and level. Another favorite method is to hold the instrument against the side under the left arm. In photographing in a crowd, or where it is difficult to avoid getting large heads or figures in the foreground, a good plan is to make sure of the composition of the picture on the finder, then elevate the camera until the back of it rests firmly against the forehead. Personally, I favor the following method as usually the most successful. Put yourself in the position "at ease," with the legs close together and the weight of the body upon one of them, let us say the right leg. Hold the camera in the hollow of the right side with the right hand only so that your thumb grips the top, and the third and fourth fingers the bottom. The second finger steadies the side of the box, and the index finger presses the shutter-release, or the bulb may be worked with the left hand where tube and bulb are used. The head should not incline too low over the instrument or the position of the body will be difficult to sustain without movement, and the exposure should be made after a breath has just been drawn in, as the body is usually more rigid than when the lungs are empty. All this may sound difficult to do at first, but a very little practice will show that it is the steadiest of all positions, and, with experience, permits of exposures as long as a second without movement. Often when photographing outdoors it is possible to steady or support the camera against a bicycle, fence, or tree. Such helps should not be forgotten, especially where a subject presents itself which properly demands a time-exposure and a tripod or proper bicycle clamp is not at hand. But as far as holding the camera in the hand is concerned, experience will quickly show the best position for each individual worker. An English hand-camerist who has done much excellent work says: If the camera is held with both hands, with the finger or thumb on the shutter-release, and the arms allowed to drop down close to the body, the camera will be brought to within about three feet from the ground with a person of average height, and at this distance the lens, if of from four to six inch focus, will include objects six feet from the camera. This is useful when wishing to take a group ten or twelve feet off, as it insures getting in a little foreground; if the object is from twelve to fifteen feet distant, then the arms may be slightly bent, and the camera raised level with the waist. This means cutting off some foreground, which is just what we want. For the greater distances, twenty to twenty-five feet, the camera may be brought breast high, still keeping it close to the body; this obviously cuts off still more foreground. If we want to work at greater distances, as, for instance, from the deck of a steamer on a river, then the arms should be stretched out to their fullest extent, and the camera levelled and the objects sighted along the top; this position cuts out a very large amount of foreground, and takes objects with the horizon line in the correct position—that is, where we see it in normal vision.

**Exposure.** The question, What exposure must I give? is always a difficult question to answer, and especially where hand-camera work is concerned. So much depends on the subject, the time of year and the time of day, the light, atmosphere, and the color in the scene. Then there is the rapidity of the lens with the aperture or diaphragm in use, the speed of the shutter, and the rapidity of the plate. With so many factors influencing success the most reasonable advice is: Learn by experience. This, however, is hardly satisfactory. Exposure metres, such as Watkin's or Wynne's, are good and help one to familiarize one's self with varying conditions, as are exposure-tables, of which Todd's *Photo Beacon Tables* may be mentioned as especially valuable. But for nine-tenths of hand-camera work, the exposure has to be estimated on the spur of the moment and judgment is the chief factor. While, therefore, I advise familiarity with exposure by table or metre, I do so regarding these helps as training the worker for exposure by mental calculation alone, based upon experience and the conditions which exist at the time of photographing.

**A Common Fault.** It may be said, as a general statement, that the greatest number of failures in work with hand-cameras arise from under-exposure. Too much reliance is placed upon the speed of plates or film, which is always an unknown factor, and on the amount of light admitted by exposure-shutters, which few take the trouble to test for their capacity in this detail. Now the first thing I would have the hand-camerist learn with regard to exposure is, that it is always possible to modify over-exposure, even when it is extreme, but there can rarely be made anything satisfactory where the exposure has been too brief. Another stumbling-block is found in the usual employment of a shutter-speed far in excess of what the subject requires. For a large majority of the subjects attempted by the hand-camerist of intelligence it is rarely, indeed, that the shutter will require working at more than $\frac{1}{20}$th of a second or $\frac{1}{25}$th, and yet how often is it worked at $\frac{1}{50}$th or $\frac{1}{100}$th. Only when movement of more than ordinary rapidity is included are these speeds required. The general rule, therefore, in beginning work with the ordinary form of hand-camera should be to use a fairly rapid plate, and give as *slow* an exposure as is possible. We will now take a table of standards which will be of use in giving us a working basis and then go on to consider exposures under varying conditions—remembering that what is said is suggestive rather than definitive.

**Exposure Factors.** The four factors to be calculated in estimating exposures for different subjects are: (1) The intensity of the light, depending upon the height of the sun above the horizon and differing according to latitude, time of year and day; (2) the diaphragm or stop used. These are usually marked to show their relation to the focal length of the lens, and when the rapidity of one is known, the exposures with other stops may readily be estimated; (3) the speed of the plate. These, as made by the best-known firms, are fairly reliable, the selection of slow, medium, or extra-rapid plates depending on the nature of the subject; and (4) the subject, whether including movement or not, whether in sunlight or shadow, indoors or out, etc.

**Plates.** With regard to plates it is advisable to choose a good brand of medium rapidity and use no other until experience proves that the brand chosen lacks in some desirable quality, as speed, or latitude, etc. A fairly accurate estimate of comparative rapidity in plates is here given:

A. *Most Rapid.*—Hammer's Extra Rapid; Cramer Crown and Instantaneous Isochromatic; Seed's Gilt edge No. 27; Eastman's Red Label and films; Lovell Extra Rapid.

B. *Medium Rapidity.*—Seed's 26X ; Lovell 50X ; Carbutt's Eclipse and Orthochromatic 27 ; Cramer Banner ; Stanley 35 ; Eastman Yellow Label ; New York Rapid: Standard.

C. *Slow.*—Carbutt's Eclipse, Jr ; Hammer's Slowest ; Seed's 25 ; Cramer Medium and Slow Isochromatic ; Cramer's Anchor : Carbutt's B16 ; Carbutt's Orthochromatic 23.

Among European plates those of greatest rapidity are Lumière's *Blue Label ;* Cadett's *Lightning ;* the Barnet *Rocket ;* Paget 5X ; and the Ilford Extra Rapid.

**Comparative Light Values.** Dr. Scott's Table of Comparative Values of Daylight at different hours of the day and seasons of the year will enable the worker to estimate the relative intensities of light at various times. It is given here as likely to be of service:

| Hours of Day. | | June. | May, July. | April, Aug. | March, Sep. | Feb., Oct. | Jan., Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|
| A.M. | P.M. | | | | | | | |
| 12 | | 1 | 1 | $1\frac{1}{4}$ | $1\frac{1}{2}$ | 2 | $3\frac{1}{2}$ | 4 |
| 11 | 1 | 1 | 1 | $1\frac{1}{4}$ | $1\frac{1}{2}$ | $2\frac{1}{2}$ | 4 | 5 |
| 10 | 2 | 1 | 1 | $1\frac{1}{4}$ | $1\frac{8}{4}$ | 3 | 5 | 6 |
| 9 | 3 | 1 | $1\frac{1}{4}$ | $1\frac{1}{2}$ | 2 | 4 | *12 | *16 |
| 8 | 4 | $1\frac{1}{2}$ | $1\frac{1}{2}$ | 2 | 3 | *10 | | |
| 7 | 5 | 2 | $2\frac{1}{2}$ | 3 | *6 | | | |
| 6 | 6 | $2\frac{1}{2}$ | *3 | *6 | | | | |
| 5 | 7 | *5 | *6 | | | | | |
| 4 | 8 | *12 | | | | | | |

In this table the light at mid-day in June is represented by 1, and we see that an exposure at mid-day in February or October requires double the length of time, while an exposure at noon in December requires four times the time, compared with a June exposure.

**Exposure Guides.** In photographing an average out-door scene on a bright day, with plates of medium rapidity and a stop *f*/16, an exposure of $\frac{1}{25}$th second will be found ample to secure a good negative. For an open landscape, or on the coast, under similar conditions, $\frac{1}{50}$th second will be required, but in such cases it is well to stop the lens down to *f*/32

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* The accuracy of these figures would be affected by a yellow sunset.

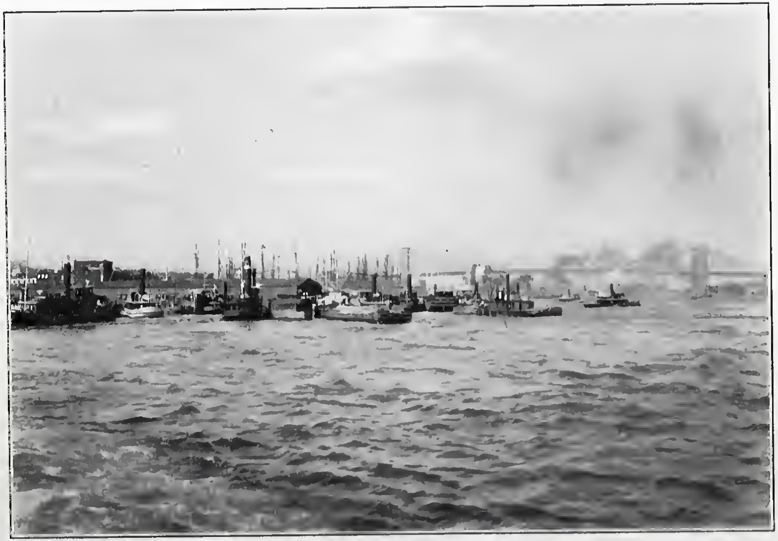
A Ferry on the Rhine—near Cologne

Pontoon Bridge and Fort Erenbreitstein, Rhine

Typical entrance to a German Village

The Old Clock at Berne

By J. HARRY LAMSON



(FROM A MOVING FERRY BOAT, F-22. TIME 1-100 SEC.)

BROOKLYN BRIDGE
By Ernest Edwards

and give $\frac{1}{25}$th second. For figures moving, from $\frac{1}{60}$th to $\frac{1}{100}$th second will be required still under the same conditions, but the lens should be opened up to *f*/8 or *f* 5.6 if this is possible. On dull days, or in cloudy weather, these exposures should be considerably increased. Views with dark masses of foliage in the foreground require longer exposures than open scenes, and pictures taken under trees will often need exposures of one-half to one minute, according to the density of the foliage. A view in sunlight (as the sunlit side of a street) may only need one-half second's exposure, while the shadow side of the street would require double that time to secure a developable negative. An average landscape in October, at noon, will require fully one second, with a medium rapid plate and *f*/16. An interior of a room will require from forty seconds on the brightest morning to three minutes on a dull, cloudy day under the same conditions.

These examples, however, are only intended to serve as a guide. If the hand-camerist will learn to judge the varying illumination of the scenes he attempts, he will speedily be able to expose fairly correctly, and with a good plate can always be sure of a negative provided he handles the plate right in development.

In photographing subjects including rapid movement the shutter should be geared to its full capacity, generally $\frac{1}{100}$th of a second, the lens opened to its largest aperture, from *f*/8 to *f*/5.6, and the most rapid plate available should be used—all, of course, provided that the subject is brilliantly illuminated. For such work, however, a focal-plane shutter is desirable, and here the exposure may be shortened to $\frac{1}{600}$th or $\frac{1}{1000}$th of a second if required. Useful tables and calculations for use with this class of shutters may be found in the Annuals and are not included here, as beyond the scope of average hand-camera work.

**Eder's Table of Exposures.** The following table of comparative exposures, calculated by Dr. Eder, may be useful to the beginner. It presupposes a fairly rapid plate and a lens working at *f*/8:

| | Time. |
|---|---|
| Laughing children, living scenes, with which one must wait for a moment of rest, and then expose by means of a slow instantaneous shutter ............... .................. | $\frac{1}{6}$ to 1 sec. |
| Domestic animals: dogs, cats, etc........... | $\frac{1}{2}$ to $\frac{1}{10}$ " |

| | Time. |
|---|---|
| Street-scenes, taken from an upper window, according to the size of the figures........ | $\frac{1}{20}$ to $\frac{1}{60}$ sec. |
| Feeding cattle or flocks of sheep in open air... | $\frac{1}{20}$ to $\frac{1}{30}$ " |
| Moving vessels at a distance of 500 to 1,000 yards.................................. | $\frac{1}{20}$ to $\frac{1}{30}$ " |
| Moving vessels of larger size and at less distance.................................. | $\frac{1}{60}$ to $\frac{1}{160}$ " |
| Animals to appear from inch to inch and a half high in the picture, and going obliquely. | $\frac{1}{60}$ to $\frac{1}{100}$ " |
| Leaping and trotting horses, flying birds, running men, &c....................... | $\frac{1}{100}$ to $\frac{1}{400}$ " |

For America these speeds should be increased fully one-third.

**Stops and Exposure.** For time exposures indoors the camera should be firmly set on a tripod, chair, or table, and a watch furnishes the easiest means of counting the required number of minutes or seconds. In such cases a small stop may be used with advantage, as giving sharper definition over the picture-image. In handling the stops of your lens to regulate exposure, remember that they are numbered in such a way that the exposure must be doubled for each size smaller used. Thus if *f*/22 requires one second exposure under certain conditions with a certain plate, *f*/16 will require only half a second, while *f*/32 will require an exposure of two seconds under similar conditions. Another excellent rule, applicable in all exposures, is to expose for the shadows, to secure detail in the darker parts of the scene, and the lighter portions can be controlled in development.

After a few exposures have been made, and notes taken at the time of the conditions of each exposure, such as the time of day, the *f*/ value of the lens, speed or number of plate used, etc., and these have been compared, the worker will begin to feel his way intelligently and a little practice with different classes of subjects will make him familiar with this detail of exposing the plate. The *Photo Beacon Tables* will be very helpful in this training.

**Development.** The development of hand-camera exposures requires, for all kinds of subjects and varieties of plates or films, a developer constituted to give detail, which can be quickly and easily controlled in operation, and plenty of patience. With these and a roomy, light-safe, dark-room, one is equipped for all difficulties. Among the many developers suited for hand-camera negatives, it would be difficult to name one superior to the rest. Rodinal, eikonogen, metol, hydroquinone, ortol, pyro, and tolidol are all good, used alone or in combination. Metol-quinol (a combination of metol and hydroquinone) is the writer's favorite. Others prefer pyro and soda, and it is certainly equal to all the requirements if one can handle it to suit the case. Tolidol is the easiest, and altogether satisfactory as far as my experience goes with it. It is obtainable in compact form and simply requires the addition of 20 ounces of water to each tube to give a developer ready for immediate use. Rodinal, also, is very simple to prepare for use, but in most instances the addition of a little concentrated hydroquinone solution is necessary to get desirable density in the negative. Pyro, of course, stains the fingers unless great care is taken in its use. It is not, however, the sort of developer one uses, but the skill with which we use it which makes success. Choose a good developer, suited to the plate you use, and get well acquainted with it. The more you know of its possibilities and handling, the better will be the results.

In developing hand-camera subjects it is always desirable to have three solutions of developer in different trays before one, a fourth tray containing water alone, and a fifth tray containing a diluted 10 per cent. solution of bromide of potassium. In addition to these we require a tray containing either a plain solution of hyposulphite of soda, or an acid fixing-bath for fixing the negatives, the latter being preferable in summer-time as a preventive of frilling. Temperature plays an important part in development; it is important that the various baths or solutions used be kept at a temperature of about 60° Fahr. To accomplish this, use a little ice or ice-water during hot weather, and slightly warm the solutions in winter by standing the developer-bottle (stock solution) in a tray containing warm water. See that your dark-room is as well ventilated as possible for comfort in working, have a good supply of water at hand, and provide plenty of safe light for working by. In this latter particular I have had so much comfort in *Carbutt's Dark-room Lamp* that I mention it as a reliable and satisfactory help in development and general dark-room work.

**In the Dark-room.** Before beginning to develop fill the three developer-trays with water and thoroughly rinse them to cleanse them from all dirt or dust. In one place a sufficient quantity of *used* or diluted developer, in another place a stronger solution, and reserve the third for starting the plate. Pour into a graduate sufficient normal developer for the size of plate to be developed (2 ounces for a 4 × 5 plate) and then, shutting the dark-room door, take out an exposed plate, place it in the empty tray, emulsion side up, and flow the normal solution of developer over it so as to cover it in an even sweep across the plate.

**Over and Under Exposure.** If the image flashes out quickly, as the plate is covered with the developer, take it from the tray and immerse it in the tray containing bromide of potassium solution. It is over-exposed and this solution will arrest development. After a few moments, take it from the bromide solution, rinse it in running water, and place it in the tray containing weak or used developer; there it will gradually develop, and when the lights are so dense that you cannot see through them when holding the plate up to the light of your lamp, rinse it thoroughly in water, and transfer to the fixing-bath. If, on the other hand, the picture does not come out when the plate is first immersed in the normal developer, wait a few moments, rocking the tray to keep the plate covered with the solution, and then transfer it to the tray containing a stronger solution of developer. In this case the exposure has been too short, and the plate requires more or less forcing. Watch its progress in the stronger solution, and when developed, rinse and transfer to the hypo-bath. A little experience will tell you how far development must go, and how it should proceed, to secure a good negative, and experience will be better than pages of theory here. If you have any doubt as to what to do in developing a negative, remove it from the developer and place it in the tray containing water only, where it can remain until you have prepared a modified solution to fit the case or otherwise decided what to do with it.

**Formulae.** When preparing a developer for any given plate, the formula given by the manufacturer of the plates is the best one to follow. Prepare the developer according to this formula with the utmost care, and use it as directed. Other developers are given below, all of which will be found useful and reliable when employed with ordinary intelligence.

### *Pyro and Soda* (Mellen).

No. 1.—Water, 20 ounces; sulphite of soda (crystals), 4 ounces; carbonate of soda, 2 ounces. Dissolve the sulphite first and then add the carbonate.

No. 2.—Water, 6 ounces; pyro, 1 ounce.

To develop a correctly exposed plate, take 1 dram of No. 2, 1 ounce of No. 1, and add 2 ounces of water.

For snap-shots, or plates thought to be under-exposed, use 1 dram of No. 2; 1½ drams of No. 1, and 6 ounces of water.

For over-exposed plates, use 2 drams of No. 2, 1 ounce of No. 1, and 6 ounces of water. Or instead of the 2 drams of No. 2 in this solution, use 1 dram No. 2 and 10 drops of a 10 per cent. solution of potassium bromide.

Stop development when you can see sufficient details in the shadows of the picture, provided that the lights have a fair amount of density (thickness or opacity).

### *Another Pyro and Soda Formula* (Thornberry).

No. 1.—1 ounce of pyro, dry, as purchased.

No. 2.—Water, 10 ounces; sulphite of soda (crystals), 2 ounces; carbonate of soda, 2 ounces. Dissolve as before directed.

No. 3.—Bromide of potassium, 1 ounce; water, 9 ounces.

With this formula absolute control can be had over the plate while in the developer, and any class of negative obtained from a thin, full of detail, to a brilliant dense negative, according to the quantity used of each. For a half-plate snap-shot, take, to commence developing, 1 ounce of B and 1 ounce of water, add 3 drops of C, then take from the bottle A enough dry pyro to cover half the blade of a penknife, place in the measure, and shake till the ingredients are well mixed. It is as well not to use too much pyro at first, as density will be obtained before all the detail is out, but a little must be added, or development will not take place. The plate must be placed in the dish and the developer poured over and well rocked so as to remove any air bubbles, and ensure even development. If the image flashes up quickly, the developer should be poured back into the measure and a few drops of C added to it, shaken, and then poured over the plate ; this will restrain the developing action a little and prevent the image becoming flat. If, on the other hand, it is a long time making its appearance, it is under-exposed, and a little of B should be added, the developer, of course, being poured back into the measure for it to be added, shaken as before, and poured on the plate. When all the detail is out that it is possible to get, more pyro should be added till the desired density is obtained. The plate should then be well washed and fixed. If a plate is known to be considerably under-exposed, it should be allowed to soak in B 1 ounce, water 1 ounce, for ten minutes ; it will not develop in this solution, but it should be rocked to prevent air bubbles forming. Then add a little pyro, and it will develop. If it comes up slowly and faint, a little more of B should be added, and a little of A till sufficiently developed. If a very brilliant negative is required, it should be given a correct exposure and be slowly developed, the developer having 10 drops of C added and a double quantity of pyro. The pyro bottle should be kept well corked, otherwise when it is used it will cause yellow negatives, and if it is allowed to blow about it will cause little black specks to form on the negative. The developer when mixed ready for developing should not be allowed to stand, but should be used at once, as pyro oxidizes when exposed to the air. It is also not safe to use one lot of solution for more than six plates, as it gets thick and causes air bubbles. If the negative is well washed after developing and before fixing, the resulting negative will be clear and free from color.

### *Hydroquinone Formula* (Shoemaker).

No. 1.—Hydroquinone, 123 grains ; sulphite of soda (crystals), 1,000 grains ; bromide of potassium, 3 grains ; water, 16 ounces. First dissolve the hydroquinone in 6 ounces of the water given ; in the remaining 10 ounces of water dissolve the sulphite and bromide, then combine the two solutions in one bottle, which label, "stock solution."

No. 2.—Water, 10 ounces ; caustic soda, 180 grains.

For correctly exposed negatives use 3 ounces of No. 1, ½ ounce of No. 2, and add 1 ounce of water. For over-exposure, dilute this solution with 2 ounces of water.

### *Ortol Formula* (Pentlarge).

No. 1.—Water, 1 ounce; metabisulphite of potash, 4 grains; ortol, 8 grains.

No. 2.—Water, 1 ounce; sulphite of soda, 48 grains; carbonate of potassium, 16 grains; sal soda (carbonate), 32 grains. To this solution add a drop *or two* of a 10 per cent. solution of bromide of potassium.

For correctly exposed plates, mix No. 1 and No. 2, and dilute with an equal bulk of water. For under or over exposure, add less or more water than equal bulk of Nos. 1 and 2 combined.

This developer gives negatives rich in detail and with a good printing color. When its varied capacities are understood it will be found to be most elastic and capable of all the modifications needed for all kinds of exposures.

*Rodinal* is a ready-prepared commercial developer and consists of a highly concentrated solution of para-amidophenol, sodium sulphite, and a caustic alkali. For use, it must be diluted to about twenty times its bulk with water, and potassium bromide added in the proportion of a grain to every two ounces of solution. Thus made up it is extremely handy for use, and will keep indefinitely. In this form it is capital for short exposures, bringing out detail to a marvellous degree.

As already mentioned, the addition to the developing solution of a few drops of strong hydroquinone solution will aid in giving density when this is lacking.

### *Eikonogen and Hydroquinone.*

This combination makes an excellent developer for hand-camera exposures. A reliable formula is as follows:

No. 1.—Water, 15 ounces; sodium sulphite, 1 ounce; hydroquinone, 30 grains; eikonogen, 80 grains; potassium bromide, 20 grains. Dissolve these in warm water to secure quick and certain solution.

No. 2.—Water, 15 ounces; sodium hydrate, 20 grains; sodium carbonate, 40 grains.

For normal exposures, take equal parts of No. 1 and No. 2. For over-exposure, add more water. For under-exposure add a few drops of a strong solution of eikonogen. In using any developer containing eikonogen, do not be deceived by the flashing up of the image, considerable time being needed to secure density.

*Tolidol*, as mentioned, is a good snap-shot developer for either films or plates; it gives an unusual amount of detail and a vigorous or soft negative according to dilution. It is very simply made ready for use and may be had specially prepared for the various brands of plates and films in the market. I have used it latterly in place of pyro as a substitute, for once equal to the " real thing," without the disadvantage of staining the hands or clothes.

**Tank Development.** When a considerable number of plates await development a simple and efficient method of handling them is to use what is known as " tank development." For this we need a grooved india-rubber tank, commercially known as a fixing-box, suited for the size of plate to be developed, and a weak developer—about half a grain of reducer to the ounce. Any of the above formulæ (except pyro-soda) will be suitable for this method if diluted to the strength mentioned, but a good formula is as follows :

Ortol, 30 grains ; potassium metabisulphite, 15 grains ; sodium sulphite (crystals), 200 grains ; sodium carbonate (crystals), 200 grains ; potassium bromide, 5 grains ; water, 50 ounces.

It is only necessary to place the plates in the tank, cover them with the solution, put on the cover, and leave them so till development is complete—say, at night and leave them till morning, or before going to business in the morning, and leave them till night, as there seems little or no tendency to over-development. Washing, fixing, and final washing are accomplished without removing the plates from the tank, and it is an actual fact that a dozen plates may be thus manipulated with less time and trouble than are expended on a single plate by the usual method.

If upon examination any of the negatives need additional density, this can be secured by a momentary immersion in a more concentrated solution of ortol, such as has already been given.

**Developing Roll-films.** Thus far we have considered only the development of plates or cut films. Cartridge or roller films require special treatment on account of their shape and tendency to curl. Such films may be cut up into convenient lengths for manipulation, care being taken not to cut through the pictures, by cutting according to the division on the black paper backing as numbered, or, as in the case of pocket kodak films, they may be developed in the strip. The simplest way of handling these small strips is to develop them in a tumbler, which plan also effects a great saving of developer. After unwrapping the film, first soak it well in water, and then, if the hole end be held between finger and thumb, and the hand raised, the film will unroll its entire length and recoil again as the hand is lowered. It is this action that must be employed in developing. The tumbler is filled with developer, the film immersed, and steadily worked up and down all the time until development is complete. This method will be found highly satisfactory, and if portions of the film are fully developed before others, the former can readily be cut out and put in the fixing-bath while development of the latter is continued.

With films such as are used in cameras for pictures larger than 2½ inches wide, it is more convenient to cut the films into convenient strips and develop them while held flat in a film-holder such as the *Ideal.* This renders their manipulation as simple as that of plates and saves handling the films with the fingers. In unrolling the film preparatory to development, take care to see that the end does not roll up over the paper backing. The various exposures should be cut off with the paper on top. Fig. 3 shows a cartridge film with the film unrolled on top of the paper. This is wrong; to correct it for cutting, simply turn back the film as indicated by the dotted lines which brings the film under the paper, when the exposures may be cut apart as in Fig. 4.

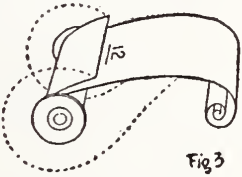


Fig 3

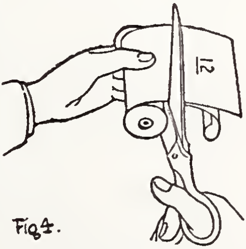


Fig 4.

Now immerse the strips, in their holders, in water and let them soak a few minutes, then proceed to develop them with any one of the formulæ already given for plates, or with tolidol, as prepared for snap-shots.

**When to Stop Developing.** The point at which to stop development is always most critical. Three factors should always be taken into consideration: *First*, the appearance of the negative image as seen by *reflected* light—*i.e.*, when looking *at* the film. By this we can estimate the degree of detail in the deepest shadows. *Second*, the appearance by *transmitted* light—*i.e.*, when looking *through* the negative. This enables us to estimate the relative densities of the lower middle tones. *Third*, the appearance of the image by *reflected* light, as seen at the *back* of the plate. This often enables one to form some opinion of the relative strengths of the high lights. For the same batch of plates and developer these appearances are practically uniform. But different brands of plates vary very considerably, so that any one of the three above guides has to be duly allowed for.

**Cooling the Developer.** It is well known that developers standing in a warm dark-room soon have their temperature raised to such an extent as to render it almost impossible to secure sufficient density under normal conditions.

Added to this we have to face the probabilities of the gelatine film frilling and blistering in warm developers, so that it is advisable to cool the solutions before use, and depend upon the warmth of the trays to bring the temperature up sufficiently high for satisfactory development.

This can be accomplished by standing the bottles of solution in a pan or jar of "freezing mixture" as follows: Ammonium nitrate, 1 part; water, 1 part. Or, if ice is easily obtainable, a mixture of equal parts of crushed ice and salt will rapidly produce an intense cold, considerably below zero.

**Fixing.** After development the plates or films should be thoroughly rinsed to remove the developer, and immersed in a fixing-solution. This is generally a plain hypo-bath composed of 4 ounces of hyposulphite of soda (¼ of a pound carton) dissolved in a pint of water. If two solutions are prepared, and the negative allowed to remain ten minutes in one and five minutes in the other, its thorough fixing and permanency are assured. For warm weather, however, the acid fixing-bath is preferable, and this may be prepared as follows, one preparation being sufficient for the work of two or three months, as the solution may be used again and again until it begins to fix very slowly, when it should be renewed: Hyposulphite of soda, 16 ounces; sulphite of soda (crystals), 2 ounces; sulphuric acid, 1 dram; chrome alum, 1 ounce; warm water, 64 ounces. Dissolve the hypo in 48 ounces of water; the sulphite in 6 ounces of water; mix the sulphuric acid with 2 ounces of water and pour it slowly into the sulphite solution; then add the chrome alum to 8 ounces of water, dissolve and mix the various solutions together in a large bottle. Ready for use as soon as the ingredients are dissolved and the solution is cold.

To thoroughly fix a negative let it remain in the fixing-bath fully ten minutes after all the white, silver-bromide appearance has been cleared away. Then wash in running water for one-half an hour, swab with a pad of wet absorbent cotton, and let it dry spontaneously.

**Intensification.** Sometimes, after development and fixing, hand-camera negatives are seen to lack density or strength for printing. In this case they may be intensified and made stronger. The simplest and best intensifier in the writer's experience is the single-solution platinum intensifier of Willis & Clements. This is prepared by adding water to the stock solution as purchased, and may be used repeatedly. It is certain and easily controlled in its action, and one is always sure that the intensified negative will be permanent, which does not always happen with other methods of intensification.

Where this intensifier is unobtainable Scolik's method may be used as follows:

Prepare a solution of mercuric chloride, viz.: Mercuric chloride, 1 part; potassium bromide, 1 part; water, 50 parts.

The negative is laid in this solution, and when it has become completely bleached the solution is merely rinsed off, and the whole is immersed in a half-saturated solution of neutral sodium sulphite in water. Here the darkening action slowly and uniformly takes place. Should the negative, however, become too dense, due either to the bleaching process having been carried too far, or the immersion in the sodium sulphite not having been sufficient to allow the silver chloride to become totally dissolved, the remedy is very simple. Continue the action, and, if deemed necessary, strengthen the sodium-sulphite solution employed. The undissolved chloride of silver can be seen by examining the back of the negative. The advantage of this method is that careful washing between the treatments is not necessary. Furthermore, the intensified plate is very constant, and does not alter during printing, as is very often the case with many of the mercury methods.

**Reducing Negatives.** When a negative is seen to be too thick or dense, it may be reduced by the following method: Take 20 grains of iodide of potassium and 1 ounce of water; add a few crystals of iodine, a crystal at a time, until the solution is a deep claret-brown. This forms a stock solution. For use dilute the stock solution with 2 ounces of water. Immerse the plate in the diluted solution until the surface of the negative appears fairly white all over. Then immerse it in a hypo-soda solution (1 to 20), such as is used for fixing aristo prints, until it regains its normal color, after which wash thoroughly. The operation may be repeated as often as is necessary.

All negatives which have any value should be varnished before being printed. This preserves them from scratches or damage from dampness in the printing frame or when stored. Negative varnish may be obtained at any dealer's store, and is cheaper and better in its commercial form than it can be made by the individual worker. To varnish a negative evenly hold it with the thumb and finger-tips of the left hand and with the varnish bottle in the right hand, pour a pool of varnish at the centre of the film side of the negative. Now incline the plate until the pool of varnish spreads to the right-hand corner, then bring it round at the top of the negative and depress the lower end of the plate until the broadened pool flows evenly all over the plate to the lower right-hand corner, whence the surplus may be made to flow off into the varnish bottle. With most negative varnishes the negative must be made slightly warm before the varnish is applied. Be careful to avoid the slightest dust or motion of the air when varnishing, and hold the varnished plate over gentle heat for a few seconds until it becomes surface-dry. Always let a varnished negative rest an hour or two before handling it, to allow the film of varnish to thoroughly harden.

We have now finished our brief resumé of the hand-camera and its work. The choice and treatment of various kinds of subjects has been left untouched because the average hand-camerist prefers to be free to photograph whatever seems desirable, whether it is properly within the scope of his instrument or not. This difficult question will be dealt with as fully as it deserves in a future number of THE PHOTO-MINIATURE. To those who desire to follow up the many interesting details of hand-camera work, such as instantaneous photography of moving objects, the testing of shutters, various lenses for different purposes, and similar topics belonging to advanced work, the following books may be recommended as offering valuable help:

## BOOKS.

*Instantaneous Photography.* By Capt. Abney. 1896. 75 cents.

*The Use of the Hand-Camera.* By Clive Holland. 1898. $1.20.

*The Hand-Camera and How to Use It.* By W. D. Welford. 50 cents.

*A Treatise on Photography.* By Capt. Abney. 384 pp. 1895. $1.25.

*The Photography of Movement.* By Dr. E. J. Marey. 300 pp. 1897. $2.00.

*Cole's Photographic Optics* has a valuable chapter on Exposures, Shutters, etc. $2.50.

The *Exposure Tables,* by F. Dundas Todd also contain useful information, as do the catalogues issued by the Thornton-Pickard Manufacturing Company, and the Reflex Camera Co., the latter, of course, being connected with the apparatus of the firms. I mention them as containing notes not otherwise accessible.

# NOTES.

The demand for THE PHOTO-MINIATURE now requires an edition of 4,000 copies—an increase of 1,000 copies over the edition printed of the first number.

❧

Supplementing the monograph on *Hand-Camera Work*, we devote considerable space in these *Notes* to novelties in apparatus and conveniences recently introduced which are likely to interest the hand-camerist. Will our readers kindly note that in these paragraphs, as in all other reading-matter pages of THE PHOTO-MINIATURE, information concerning trade articles is given, not to " boost " the manufacturer or advertiser, but simply because we think our readers should be informed. Hence whatever is of interest will be briefly noticed, but nothing will be recommended of which we have not either practical knowledge or experience.

❧

The forthcoming photographic exposition, to be held in New York, October 21st–28th next, promises to be fully as interesting as it should be. We have already mentioned the hearty co-operation promised by American manufacturers of photographic specialties. Many foreign manufacturers have since expressed their intention of being well represented, and an historical collection of unusual interest is to be sent from Great Britain. This will include examples of the work of Daguerre, Fox Talbot, Scott-Archer, and other pioneers, and will be accompanied by a number of selected specimens of modern photography by the best British workers. Ernest R. Franks, 11 Howard Street, New York, is the organizer of the exposition, and all communications relating to the show should be addressed to him as above.

❧

*Sensitol* is a novelty which will surely find favor among amateurs. It is a one-solution sensitizing liquid, and may be applied with a brush to any absorbent material, such as paper, postal cards, silk, fabrics, leather, wood, etc. As soon as dry, photographic prints of rich color may be obtained on any material so sensitized by ex-

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posure under a negative in the usual way. Sensitol prints are developed in cold water, and afterward require fixing in a plain hypo-soda solution to render them as permanent as the average print.

◆

*Kruxo* is another specialty recently introduced, a developing paper in two grades, mat and glossy. Like *Velox* and *Dekko*, *Kruxo* is simple in its manipulation, requires no dark-room in its use, and offers an easy means of obtaining many prints from a single negative in a very short time. Both *Sensitol* and *Kruxo* are introduced by the Haller-Kemper Co. of Chicago.

◆

*Patent Photographic Developers* is the title of a useful little handbook issued for free distribution by the Actien Gesellschaft für Anilin Fabrikation of Berlin. It contains the standard formulæ and instructions *re* Rodinal, Eikonogen, Diogen, Amidol, and Diphenal, and should be on every photographer's book-shelf. Most dealers supply copies on request, but our copy came from George Murphy, New York.

◆

The California Camera Club (San Francisco) gave its 108th illustrated lecture on Friday evening, May 19th. Subject, *Norway;* and lecturer, Frederick W. Monsen. A new feature in club-life was inaugurated at the last outing of this club, viz.: an over-night outing, tents being provided at the camp chosen, to enable the visitors to be in time for the early-morning effects.

◆

Another system of photographing in colors has been discovered, and, as usual, it is simpler than all others. This time the discovery is announced by Mr. Friese-Greene, a worker well known in British photographic circles, and the system is described as follows — We quote from the London *Daily News:*

"A photographic negative of a scene or picture is taken by means of a camera or photographic apparatus through a transparent material or medium bearing three or more primary colors. The negatives thus obtained will contain not only the several colors employed, but also all the varieties of color caused by the blending of

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ARROW BRAND

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*ST. LOUIS, April 1, 1899.*

*J. C. Millen, M.D.*
*Denver, Colo.*

*Dear Sir:*

*Your esteemed favor of the 28th ult. was duly received, and we regret that we have not been able to report to you before on our results with your Chromium Salt and Chromium Fixing Salt, having been extremely busy on account of alterations in our factory which have been going on while at the same time we were obliged to manufacture right along, not being able to stop until our arrangements could be completed. However, what you have sent us has been tested lately, and our Chemist reports that his results with these Salts have been highly satisfactory. He has tested same with our Opals and obtained very clear delicate whites. This is a severe test, and if this Fixing Salt is good for Opals it is certainly excellent for almost everything else as it simply means perfectly clear shadows without stain or any other defect. We wish you success with these articles, and are sure that they only need to be known to be appreciated. Hoping you will excuse the delay in our reply, owing to pressure in our regular work, we are*

*Yours truly,*

*M. A. SEED DRY PLATE CO.*
*M. A. S.*

Send to the Manufacturer for Descriptive Circular

these colors. Then, by obtaining a transparency in the usual way from this negative, and projecting the image from the transparency upon a screen by means of a lantern through a transparent medium, colored and constituted similarly to the transparent medium employed in taking the negative, the image appearing on the screen will show all the colors of the original scene or picture." The novelty in Mr. Friese-Greene's method is the transparent medium employed. This consists of a disk of glass composed of differently colored sectors. In taking a photographic negative, or in projecting a transparency obtained from such a negative, this disk is caused to revolve rapidly in front of, or behind, the ordinary lens of the taking or projecting apparatus, the several colored parts of the disk moving successively past the lens during one and the same exposure........The advantages of the Friese-Greene over the Ives process lies in the fact that only one picture is taken instead of three, and that it can be applied to all branches of ordinary or animated photography. In the Ives process a considerable exposure has to be given to the three negatives, the length depending on the colored screen employed. Instantaneous photographs or pictures of persons or animals, though impossible by the Ives method, are yet quite possible by the devices employed by Mr. Friese-Greene.

⁂

An entirely novel hand-camera is the *Magazine Dry Tin-type Camera*, just introduced by H. A. Hyatt, of St. Louis. This instrument will take twenty-five pictures without reloading, permits of short exposures of two to six seconds, requires no dark-room, as it has a developing and fixing chamber within itself, and makes a picture 2½ × 3½ inches. For further information about this really wonderful "Wonder" we must refer the reader to Hyatt's "Bargain Vendor," which he sends free on request.

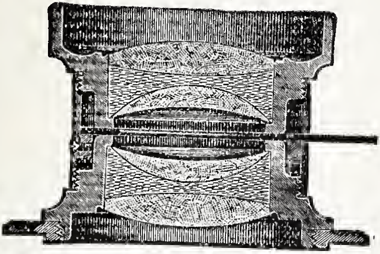
⁂

The new Eastman hand-cameras for 1899 are the No. 2 *Folding Pocket Kodak*, which gives an instrument for 3½ × 3½ inch pictures, in an extremely portable form, suitable for the pocket; the No. 2 *Folding Bull's-eye* for 3½ × 3½ inch pictures, very similar to the foregoing, but less expensive; the *Panoram Kodak* for pictures

# THE GOERZ

# DOUBLE ANASTIGMAT

GERMAN PATENT 74,437



UNITED STATES PATENT 528,155

Is the most perfect lens on the market, and the only truly corrected Anastigmat, as **it covers at full opening sharply up to the circle of light,** a thing no other lens does. The lens can therefore be used at full opening on a larger plate as a wide-angle lens. It is unequalled in its covering capacities, its speed and depth of focus.

Nearly all prominent photographers and advanced amateurs use the Goerz Lens. Mr. Alfred Stieglitz says:

"Nine-tenths of my hand-camera work is done with a Goerz Lens. That is sufficient to show what opinion I have of your lenses."

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Kindly mention The Photo-Miniature

3½ × 12 inch, the most portable camera in the market for panoramic photographs; and the No. 4 *Eureka* camera for 4 × 5 plates, a focusing box-camera of excellent quality at a very low price. All may be used for cartridge films. Detailed descriptions may be seen in the 1899 Kodak Catalogue, which is embellished with a daguerreotype of Daguerre. The two diagrams on page 137 showing how to roll a cartridge film before cutting exposures for development are reproduced from *Picture Making and Picture Taking* by courtesy of the Eastman Kodak Co.

❧

A monthly journal exclusively devoted to animated photography (*La Chronophotographie et ses applications*) reaches our table from Paris. Mons. B. Matuszewski is the editor and may be addressed at 33 Rue Boissy-d'Anglas.

❧

The American Institute has removed its head-quarters to 19-21 West Forty-fourth Street, New York (Berkeley Lyceum Building), where in future all meetings of the Photographical Section will be held.

❧

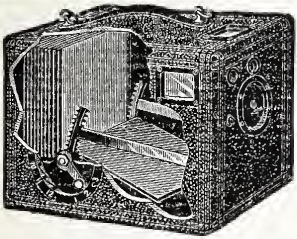
One of the most interestingly illustrated camera catalogues of the season is the *Montauk* list issued by G. Gennert, New York. Among the new *Montauks* we note especially the Long-Focus Reversible-Back model and the Gray Day Series, these latter being fitted with Collinear lenses, which enable the hand-camerist to work at any season regardless of weather and similar unfavorable conditions. The Montauk Twin-Lens camera is, we believe, the only instrument of its class made in America, although they are fairly popular in Great Britain.

❧

A collection of carbon reproductions of drawings and sketches by the English master, Constable, has recently been published in London. These reproductions are forty-two in number, printed on drawing paper, and mounted on India-toned boards. It would seem desirable that a few sets of this collection should be secured for America, copies of Constable's works being scarce on this side of the Atlantic.

# "Adlake Repeater"

## Rapid Action Magazine Camera



Loads 12 plates. Takes 12 pictures without opening the box. Twelve in ten seconds if you're in a hurry. Is fitted with **New Adlake Metal Shutter** with four stops; the only shutter ever made for fixed focus camera not affected by warping or shrinking of shutter board. The Exposure Register has self-locking Exposure Lever preventing more than one plate leaving the magazine at a time. The best single achromatic lens—removable lens holder. The Repeater is perfect in plan and action.

| | |
|---|---|
| **Adlake Repeater, 3 1-4 x 4 1-4,** . . | **$5.50** |
| **Adlake Repeater, 4 x 5,** . . . | **$8.00** |
| **Adlake Regular, 3 1-4 x 4 1-4,** . . | **$6.50** |

With 12 Single Metal Plate Holders—Light tight—dust proof.

**Adlake Regular,** with 12 Single Metal Plate Holders, 4 x 5, - **$10.00**

**Adlake Special,** with 12 Single Aluminum Plate Holders, 4 x 5, **$12.00**

New Adlake Metal Shutter. Portrait attachment. Device for making panoramic pictures FREE with all Adlakes. New Multiplex Attachment for taking 2 to 4 pictures of same object in different positions on one plate, **$1.00** extra. New 1899 Adlake Booklet FREE. Mounted photo 5 cents stamps.

**New Devices on all 1899 Adlake Cameras**

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# Adlake Regular

## 12 Light-tight Plate Holders

A Photographic Contest of interest to all hand-camerists is announced by the Ray Camera Co., of Rochester. The prizes to be awarded (for pictures made with Ray Cameras) include a free round-trip to the Paris Exposition of 1900, one hundred dollars in gold, and Ray Cameras ranging from $60 to $5 in value. Particulars may be had from the Ray Camera Co., on request. The 1899 Ray catalogue, by the way, shows the action of various camera movements in a very clear way by the use of line diagrams, a method not hitherto adopted in camera catalogues and one which we wish was more general.

❧

*Photographic Life* is the title of a new journal announced by the Nepera Chemical Co., to be conducted by Mr. Walter E. Woodbury, late editor of the *Photographic Times*. Another new journal of which we have news is *Camera Obscura*, to be published at Amsterdam, under the editorship of J. A. Schouten. This last is to be printed in four languages, and the first edition of No. 1, Vol. 1, is to be 50,000 copies. This, we believe, is the largest edition of any number of a photographic journal so far published.

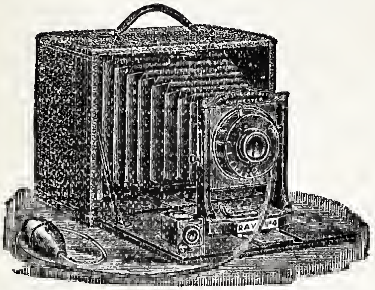
❧

The *Adlake Cameras* 1899 models show many improvements over last year's forms, including Portrait, Panoramic, and Multiplex attachments, for both Regular and Special models. The plate-holders in the Adlake Special are made of aluminum. Another novelty of this season is the Adlake Repeater, a magazine camera with peculiar constructional advantages. (Adams & Westlake Co., Chicago.)

❧

In all hand-camera work where a large image of the subject is desired, or an object of interest has to be photographed from a distance, or where copying or enlarging pictures are to be attempted, only the long-focus camera will give complete satisfaction. Among the new models of this class the long-focus *Solograph*, of the Scovill & Adams Co., is remarkable for focal capacity, the bellows extension being twenty-six inches for the 5 × 7 plate size. This exceeds the focal capacity of many instruments of the kind and gives the *Solograph* corresponding advantage for the work which

RAY CAMERAS



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these cameras are specially constructed to cover. A special device is fitted to keep the camera bellows from sagging at the centre—this is an important detail and will save the loss of many plates. The *Solograph* may be used for plates, cut films or roller films at will, and is made in the usual portable medium-focus style as well as for long-focus lenses. The 1899 booklet, "Photographic Advice," sent out by the manufacturers of the *Solograph* (The Scovill & Adams Co., New York), is well worth asking for.

◆

An exhibition of photographs by Alfred Stieglitz was given at the New York Camera Club, May 1st–15th, which by its character demands a word of appreciation. The collection embraced eighty-seven examples of Mr. Stieglitz's work, from its beginning some fifteen years ago to the present time, and as an exhibit of pictorial photography certainly surpassed any one-man show we have seen in New York. The catalogue of the collection was a dainty *brochure* with an *Introduction* by Mr. Joseph T. Keiley, and a cover embellished with a signed photogravure from the "Gossip, Katwyk," picture of the London 1896 Salon.

◆

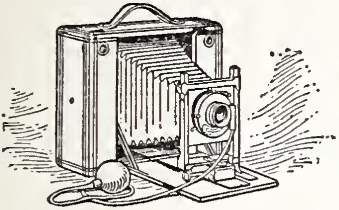
An entirely new series of folding hand-cameras introduced this year is the *Ascot Series*, made by Messrs. E. & H. T. Anthony & Co. of New York and Chicago. Their special features are extreme portability, fineness of construction, and their adaptability for either plates or cartridge films, as the worker may desire. No less than twenty different styles are listed in the new *Ascot* catalogue just issued, and the reader about to purchase should see this list before he sets out to buy an instrument. Unlike many camera catalogues, it is written in a practical way without tedious repetition, and plainly tells how one instrument differs from another instead of giving page after page of bewildering verbiage.

◆

The *Graphic Magazine Plate-holder* introduced by the Folmer & Schwing Mfg. Co. of New York, is a feature bound to be popular with cycle-camerists. It carries twelve plates in as many metal septums, occupying the space usually required by three plate-holders, and may be fitted to any standard make of camera, or attached

*There* *is* *no Kodak but the Eastman Kodak.*

# No. 5 Cartridge Kodak



**For**

**5 x 7 Pictures**

**Uses Light-Proof Film Cartridges or Glass Plates.**

A perfect instrument for the expert or the beginner, combining the simplicity of the daylight loading Cartridge System with a camera of the greatest capabilities.

The No. 5 Cartridge Kodak is equipped with the finest rapid rectilinear lenses, iris diaphragm stops, Eastman pneumatic triple action shutter, has rising, falling, and sliding front, two view finders, two sockets for tripod screw, rack and pinion for fine focusing and is beautifully finished in highly polished mahogany with buffed brass fittings and covered with fine black Morocco.

**PRICE.**

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| No. 5 Cartridge Kodak, rapid rectilinear lens and pneumatic release shutter, - - - - - - | $35 00 |
| Light-proof film cartridge, 12 exposures, 5 x 7, - - | 1 60 |

**Kodaks $5.00 to $35.00.**

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to the back of a cycle-camera. The *Telescopic Graphic Special* camera is another novelty put out by this firm which merits notice. It is peculiarly adapted for sportsmen and tourists, is made in the 4 × 5 inch size only, adapted for plates or cartridge films, and carries a No. 2, Series IIA. Zeiss lens, which embraces almost all kinds of work, and works at *f*/8.

❧

A series of useful and profusely illustrated *Monographs on Artists* is appearing, of which picture-lovers should make a note. No. 1 comprises an account of Raphael and his work—132 pp., with 128 illustrations in half-tone. No. 2 is devoted to Holbein—166 pp., with 150 illustrations. At their price, $1.50 each, these books bring the masters of painting within the reach of even the poorest students.

❧

A photographic club in one of the Southern States has adopted the brief and mysterious motto, "P. L. P." I asked several of my acquaintances what the letters might mean. One suggested a secret society; another said, plates, light, and paper—but I afterward learned that the symbol stood for "Please look pleasant." I do not know if a photographer has ever asked his sitters to look pleasant—to do so is a good way to make them self-conscious—but it is one of the oldest jokes connected with photography. Many years ago George Du Maurier drew a picture of a very haughty and much-disgusted damsel seated before a camera, and the operator was represented as asking her to "think of 'im." To think of something beyond one's self is certainly one of the surest ways of looking pleasant, and many a woman's best photograph has been secured when she has been intent only after a good picture of the child on her knee. Baden Pritchard suggested that the best means of occupying a sitter's attention was to ask him to repeat to himself his favorite song or poem.

❧

Our English friends are troubled, as usual, by the free-portrait swindlers. These ingenious rascals work a simple confidence trick on the public by offering an enlargement from any photograph, free. Their ostensible reason is a desire to introduce their beautiful work, for surely if you get a picture you cannot fail to be charmed,

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RELIABLE IN EVERY WAY

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and tell it to your friends who, of course, will want other enlargements, for which they will pay. So far so good; but before the victim receives his free portrait he is bled for a frame at about six times its market value; and is similarly mulcted for express charges, for there is no such thing as carriage forward, or C. O. D. In practice the odds are in favor of the victim paying his money, receiving a worthless enlargement, and then futilely cursing. Of course all this tells heavily against the honest professional worker. The particular offenders in the present instance are reputed Americans, and this tends to aggravate the trouble. But it is no unusual thing for our English friends to ship defaulters over here, and we may be pardoned, in these days of brotherly love and reciprocity, if we return the compliment and present them with a few of our rogues. We have free-portrait men enough on this side, to our sorrow, and we extend our sympathy across the water, but, don't re-ship the fellows over here.

◆

Color photography has just been discovered in three different countries; and an ingenious journalist has unearthed "pin-hole" photography as a novelty.

◆

The flexible film as a support for a sensitive surface has been so very "convenient" that there is a tendency among many to relegate it to the position of a novelty for amateurs. On a film, however, Sir Norman Lockyer has just photographed a spectrum thirty inches in length. The photograph was obtained through a concave grating ruled 20,000 lines to the inch. The focal plane of this grating was considerably curved, and hence it was impossible to get sharp definition to the edges on a glass plate. But a flexible film could be bent to the required curvature and so obtain a continuous registration which formerly had to be obtained on a number of separate glasses. By the use of the film Sir Norman expects to take much greater advantage than hitherto of the brief opportunities for observing the special phenomena of solar eclipses.

◆

A recent paper by Mr. Richard Hines, Jr., on "Women in Photography," giving brief sketches of a number of well-known American workers, has called forth some

ART CATALOGUE

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criticism from an English contemporary, who remarks that the greatest of women photographers was the late Mrs. Cameron, and that her work has never been equalled. Our friend is basing his remarks on the status of ten years ago, when in this country, as in England, ladies were just commencing to be a power in the more pictorial and decorative lines of work. In England there are several women workers of ability, but neither in professional nor in amateur work have they reached the standard set by the American. Mrs. Cameron was an artist to her finger-tips and her work will live. But Mrs. Cameron was the first, and her name is known, as is the name of Rejlander. There are workers to-day among American women—and abroad—who produce such work as none but masters produce, and who have the added advantage of a thorough understanding of the technique of their media. The fingers of one hand would almost all be used in checking those of the first rank, in America alone.

◆

Andrew J. Lloyd & Co., of Boston, send us a bulky volume of over two hundred pages, the catalogue of their photographic department. Their audacious motto on the front cover is calculated to strike speechless those who deny that photography is art. Inside the glaring covers, however, are prices and particulars of "everything" photographic, and a supplement of formulæ and instructions which will prove a useful text-book to the beginner, and a reference for older workers.

◆

Philadelphia has ever been a home of photographic journalism, and after a brief cessation from activity has again taken her old position. The *American Journal of Photography*, recently resuscitated, is a strong magazine, and its April issue is a wonderfully good number. It is published at 817 Filbert Street. *The Camera* is another Philadelphian which is striking out for a broader field after a short life of usefulness as the especial organ of the Columbia Photographic Society.

◆

The Germans have a happy faculty of squelching advertisers who say things untrue. Let a man advertise an "unrivalled hat," and his competitors hale him before a judge, swear that their hats rival his, and he is in an

The New Photography

For the Army of Enthusiastic Amateur Photographers (long since past the button-pressing stage) we have prepared

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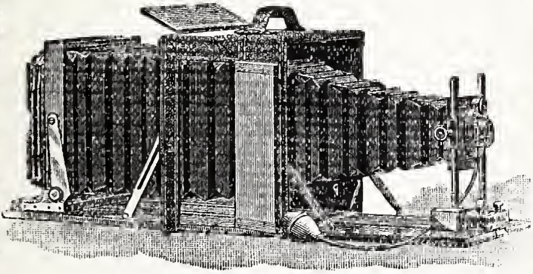
Handsomely Illustrated Manual, sent post-free on receipt of ten cents in postage stamps.



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The latest and most practical instrument for the discriminating amateur.

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evil case. This somewhat grandmotherly legislation has just fallen heavily on the freedom of the press. It appears there is in Germany a paper called *Photo Humor*. We all know German "humor," and probably the photographic branch is of parent stock. However that may be, our brother editor is a genius, and he suggested that as humorous papers were the cause of the increased number of amateur photographers—a decidedly humorous axiom in itself—it was probable that they contained a power for good and for evil. He wrote to the Eastman Company, and suggested that if he made uncomplimentary remarks about kodaks, the probable result would be a slump in cartridge-cameras. Now there are many people who say uncomplimentary things about kodaks—after they have been taking snap-shots by moonlight or gaslight, and find they can't recognize their negatives—but these things are said in the privacy of the dark-room, and not in the world-wide circulation of *Photo Humor*. The editor of *Photo Humor* decidedly had a forehead of brass, but alas, also the feet of clay. He demanded an advertisement as hush-money, and weakly quoted sixty per cent. off list rates. He should have put up a bluff, and trebled his rates. As it was, the Eastman Kodak Company went for him, and apparently they came out on top, for the humorist goes to jail for fourteen days without the option of a fine, and we have not yet heard of any slump in the kodak market.

◆

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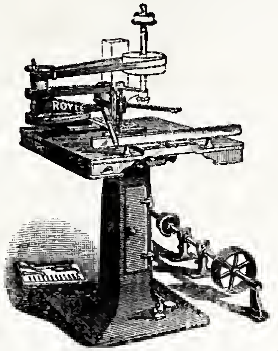

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Vol. I JULY, 1899 No. 4

# PHOTOGRAPHY OUTDOORS.

Nature outdoors is the world's shrine. We love the homes we build, and cherish the varied life which flourishes under the sheltering roof-tree ; but, for the multitude, the keenest pleasures of life are found outdoors under the open sky. It is the old Pantheism, which is not dead ; for all sorts and conditions of men, learned and unlearned, little and great, nature outdoors is the great revelation which, unto every man according to his need, tells those things which are for his soul's peace. Hence we are never happier than when exploring the beautiful and interesting places and things which nature and art have scattered with generous hands over this green-carpeted world of ours, and one practical outcome of our happiness is the universal desire to record, to picture what we see in our walks abroad. This is the source of all the arts, and, to my mind at least, the most rational explanation of the popularity of photography. We are not content, since memory is fickle, to store up in the mind's treasure-house what has interested us here or there ; we must fashion to ourselves actual resemblances of those things in which we have had pleasure, and so we make pictures; and photography, once known, becomes the hobby of the nations.

There is no lack of instruction-books on photography, but I am not aware of any *little* book devoted simply to photography outdoors, as practised by those who use the camera merely as a means of making for themselves reasonably faithful records of places and things as they saw them. There is here no question of photography as an art, or as a science ; I deal with the process only as a means to an end, and that end is pleasure. From this view-point, then, this little book is written : to explain the essentials of successful camera work afield, the apparatus needed and its use, the choice and treatment of various classes of subjects, and such general hints as will enable the reader to accomplish in the easiest way what he desires in his use of the camera.

First of all we should realize that photography can give us two distinctly different transcripts of what we see, the mere record correct in delineation, with every detail which the eye gradually perceived as it roamed over the object; and another record which, for convenience, we will speak of as a pictorial record, faithful in all the essential characteristics of the object seen, but with its details so manipulated that instead of a map-like transcript we have an amount of sentiment in the picture which adds to our pleasure in it. We have the same thing in nature. On a clear day at noon we look from our window and see a delightful valley stretching as far as the eye can see; there is no haze, everything stands out clear and distinct; the nearby town, the farm-houses and bits of woodland here and there. It is a pleasant sight, but we turn away and it is quickly forgotten. We see the same scene when the sun is low; purple mists hang about the valley, the long shadows and shafts of mellow light here veil and there illuminate, the nearby town and farms have lost their harshness of outline and everything is softened. The aspect of the scene is changed. It is the same view which we had at noonday but with a new element added—mystery. We feel, rather than see, the beauty of the landscape, and though we turn away, yet we do not so quickly forget it, and when the mind goes back to that valley in after days, we recall for a moment the clear view, but we linger over that other aspect which charmed as much by what it veiled as by what it revealed. So it is with our photographs; we can make them what we will, but if we get into them feeling, individuality, sentiment—make them recall not merely the scene, but the emotions which it originally called forth—we will have more pleasure in our work and in the results.

**Apparatus.**

Before we can photograph, however, we must decide upon the necessary apparatus, the tools with which we are to work. We need a camera, a tripod, at least six plate-holders, or a roll-holder if we are to use film cartridges instead of glass plates; three lenses for various sorts of work, an exposure shutter, and a ray filter. Other little conveniences will be named as we need them. Whether a stand (tripod) or hand-camera be chosen must be left to individual taste. The hand-camera has positive advantages for outdoor work on plates less than 8 × 10 inches, but for all-around photography the stand view-camera has many points in its favor. Simplicity of parts, sound construction, rigidity in use, and compactness for carrying are points to be considered in the choice of a camera. The essential movements (for an average view-camera for photographs 5 × 7 inches) are reversible back, double-vertical swing-back, a thoroughly good bellows made of Russia leather, rising front, rack and pinion focusing movement, and a front base-board which falls out of the field of view (or a back which slides forward on the base) when an extreme wide-angle lens is to be used. If the tripod-head is fixed in the base of the camera, the chief nuisance in carrying a tripod will be obviated.

**Reversible Back.** A reversible back simply means that the back of the camera is made square instead of conforming to the proportions of the plate. The frame carrying the focusing screen is separate from the back itself and may be reversed when an upright view is desired, which obviates unscrewing the whole camera from its tripod and reversing it, the method employed in making upright pictures before the introduction of the reversible back.

**Swing-back.** The swing-back (double-vertical movement) is a very useful feature in many kinds of outdoor work and its uses should be well understood. These are (1) for obtaining vertical lines with a non-distorting (rectilinear) lens; (2) for obtaining approximately vertical lines when a single (landscape) lens is used; (3) for obtaining a sharper image of the foreground and distance in a view than can be obtained except by the use of a very small diaphragm. Let us illustrate these uses: If we set up our camera to take a tall building, it is probable that we cannot include the top of the building, so we tilt the base of the camera at an angle until the whole building appears on the ground-glass which is thus thrown out of the vertical plane. If we look at the image on the focusing screen we see that the lines of the picture converge toward the top of the building. By swinging the camera back so that it is again vertical—*i.e.*, parallel with the board carrying the lens—we get the lines in the building parallel also, provided, of course, that we use a rectilinear lens. Similarly, we know that single lenses, with a stop in front, such as the ordinary landscape lens, render straight lines as barrel-shaped if they appear at the outer edges of the plate. The swing-back will minimize this distortion by slightly straightening the curvature of the lines. Again, in landscape work we know that, since the focus of the near objects is further from the lens than more distant objects, if the foreground occupies the top half of the focusing screen, this part will appear blurred and out-of-focus. We can remedy this by securing more "depth of focus" by inserting a small diaphragm. This, however, reduces the illumination and lengthens the exposure. If we pull out the top of the swing-back, the increased focal length from the lens required for the foreground can be secured without sacrificing the distant objects in the view and the use of a smaller stop is obviated.

**Bellows.** The necessity of a thoroughly good bellows is one of those things which we often learn by sad experience. This part of the camera is the most fragile in material and yet most constantly used, hence it should be at once flexible and light-proof. Russia leather is the best material meeting these requirements.

**Rising Front.** A rising and falling front means that the front board carrying the lens is so fitted that it may be moved up or down at will. In its normal position this board carries the lens so that a line through the axis of the latter would meet at the centre of the sensitive plate. With the lens in this position, however, we sometimes get more foreground or more sky than we desire in a view, and the proportions of these may be reduced or increased by moving the lens up or down, which is accomplished by means of the rising and falling front.

**Rack and Pinion.** The rack and pinion focusing movement is an arrangement by which the front (or back, as the case may be) of the camera is made to travel along the camera-base until the image is sharply focused on the screen. A front-focusing arrangement is preferable to a back-focus. Sometimes, in using a wide-angle lens for architectural work at short range, the front of the camera base-board appears in the field of view. This can only be remedied by making the base-board in two parts hinged together, so that the front part can be dropped down out of the field of the lens. Or if the whole camera can be made to move forward on the base-board, as in some models, the same end is attained. Other helps to good work are a flat, circular spirit-level set into the back of the camera; a metal strut for bracing the lens-board to its base when a heavily geared shutter is being used, by which means we may avoid fear of vibration; and a focusing cloth of liberal dimensions, velvet or india rubber, provided with an opening at one end to slip over the lens so that it cannot be blown about by the wind.

**Tripod.** In a tripod we want rigidity and portability. The weak points are the joints, either folding or sliding, and the screw in the head. The latter is always missing when needed unless it be permanently attached to the tripod, as it is in some models. Tripods with two joints in each leg, the upper one folding and the lower one sliding, are the most desirable. Light-weight tripods are a delusion, easy to carry, and easier to break at a critical moment. Select one which is not cumbersome, but beware of one which is praised as a "feather-weight." Much the same may be said about plate-holders: if they are light in construction they are liable to buckle, twist, leak light and be generally unsatisfactory. There is a happy medium known as the *Perfection* holder which I have found completely reliable in ten years' constant work.

**Lenses.** Our choice of lenses must be regulated by the extent of our purse, and the extension of bellows given by the camera to be used. If expense is not a matter of first importance, a good single lens such as the *Zeiss Anastigmat*, Series VII., should be our first choice. This should be (for a 5 × 7 plate) No. 4, with a focal length of 14 inches, if the camera bellows will rack out to 15½ inches. By buying No. 3 of the same series (focal length 11½ inches), we have two excellent single lenses, working at *f*/ 12.5, with a large circle of illumination and definition; and we may combine the two to form a *Convertible Anastigmat*, Series VIIa., No. 8, working at *f*/7, with a focal length of 7 inches. This will give us three lenses of different foci and remarkable power at a very moderate cost. If the expense be too great the Gundlach *Rectigraphic* offers three lenses in a single tube, each of which has a different focus ; or we may choose an inexpensive single landscape-lens, a rapid rectilinear, and an extreme wide-angle lens which will be found equal to all average requirements. Still another choice would be the *Goerz Double Anastigmat*, Series III., No. 2, a symmetrical combination giving two lenses of different foci, and embracing an angle sufficient for architectural or street work. The number of lenses from which one may choose one's equipment are legion. I have named those with which I am most familiar ; there are others which may be equally good. Among inexpensive rectilinears Darlot's *Hemispherical* deserves mention, and Gray's *Extreme-angle Periscope* is an excellent lens which I have used with much satisfaction. The Series III. *Collinear* is a useful objective, working at *f*/7.7 and embracing a greater angle than some other anastigmats. Dallmeyer's *Stigmatic* finds favor with many outdoor workers because it combines four different lenses in one.

The errors arising from miscalculating the working apertures of doublet lenses when used otherwise than as sent out by the makers urge me to make room here for a useful note by Mr. G. E. Brown on this detail. He says :

"Most photographers are aware that by using one component of an R.R. lens, a lens of much greater length of focus is obtained. Roughly speaking, either component is about double the length of focus of the whole lens. This is merely a rough approximation, as a few figures, due to Mr. Chapman Jones, will show. They indicate the desirability of not relying on the empiricism just quoted, but of determining the focus of each component for one's self.

| Focus of Combination. | Focus of Back Component. | Class of Lens. |
|---|---|---|
| 4.4 inches. | 7.8 inches. | W. A. |
| 5.8 " | 10.4 " | " |
| 7.8 " | 14.2 " | R. R. |
| 12.9 " | 22.7 " | " |

"It is rather important to know the exact focus of each single component, because the exposure required varies as the square of the length of focus. For example, if ten seconds' exposure is required with an R.R. of five inches focus, then keeping the same stop *in situ*, but using the back combination of, say, ten inches focus, the necessary exposure will be (roughly)

$$10 \times \frac{10 \times 10}{5 \times 5} = 40 \text{ seconds.}$$

"This calculation is simple enough when each single component is exactly or approximately double the focus of the whole lens, but, as above stated, this is often not the case, and in some of the new lenses, the relation of the two components to the whole combination is different. Dallmeyer's *Stigmatic* is an example. The quarter-plate lens has a focus of 5.3 inches, the back combination a focus of 10.25 inches, and the front one of 7.75 inches. It is, of course, an advantage to have the choice of three different foci in one lens, but it should be carefully noted that the F. numbers inscribed on the lens-mount assume quite different values when one or other of the components are being used. The worker is advised to calculate the value of each stop when used in conjunction with either component and to embody his results in a little table, which should be written on a card and carried in the camera-case. In making such a table the readiest way is to first ascertain by practical trial the focal length of each component, either by focusing on an object at a considerable distance or by any other method. It is not always safe to assume the separate lenses to have the focal lengths stated in their makers' catalogues. These values when divided by the diameter of the diaphragm will give the F. value of each of the latter under the new conditions. Treating each stop in this way we obtain our table as follows :

*Dallmeyer's Stigmatic.*

*F. Values of Stops when used with*

| Combination. | Front Lens. | Back Lens. |
|---|---|---|
| F. 6 | —— | —— |
| F. 8 | F. 14 | F. 18 |
| F. 11 | F. 20 | F. 25 |
| F. 16 | F. 28 | F. 36 |
| F. 22 | F. 40 | F. 50 |
| F. 32 | F. 56 | F. 72 |
| F. 45 | F. 80 | F. 100 |

"For the sake of completeness, most of the values are represented above, though some of these would hardly be useful in practice. In the above case the stops F. 20 and F. 28 (equal to F. 11 and F. 16 on the lens-mount) would be the best to employ with the front lens, and F. 25 (equal to F. 11 on the lens-mount) for the back component."

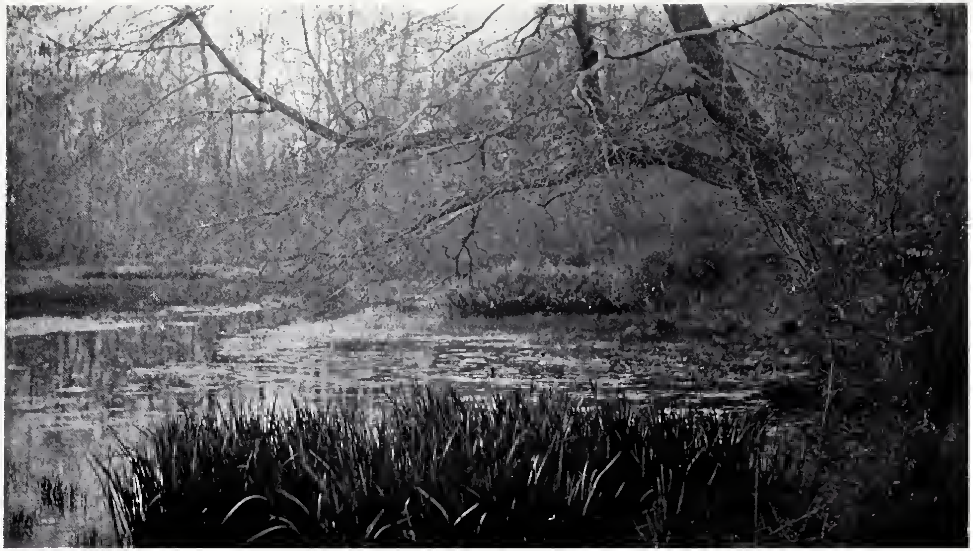
Other notes on the choice and use of lenses for various purposes may be found in *Modern Lenses* (PHOTO-MINIATURE No. 1), to which the reader is referred, as the subject cannot be dealt with completely in this handbook.

**Exposure Shutters.** The selection of an exposure shutter for outdoor work does not present any unusual difficulty. For all work except that including extremely rapid movement, the Bausch & Lomb *Diaphragm* or *Unicum*, the Goerz *Sector*, the *Gundlach*, *Low* No. 5, and *Thornton-Pickard* "*T. & I.*" will be found fully satisfactory.

For seascapes and surf photography the roller blind-shutter has the advantage of keeping the lens surface free from moisture or spray while waiting for the moment of exposure; a single shutter, moreover, by means of rubber adaptors, may be used with several lenses. On the other hand, the diaphragm shutter has its peculiar advantages, such as equalizing the light entering the camera, giving the image a greater apparent depth of focus and detail in the shadows. With either of these varieties of shutters, objects including movement not greater than fifty miles per hour may be photographed successfully. In ultra-rapid work, such as photographing speed-trials, express trains, the finish of a race, etc., the *focal-plane* shutter should be used. With the amateur, however, the need for a shutter of this speed ($\frac{1}{600}$ to $\frac{1}{1000}$th of a second) will be encountered very rarely.

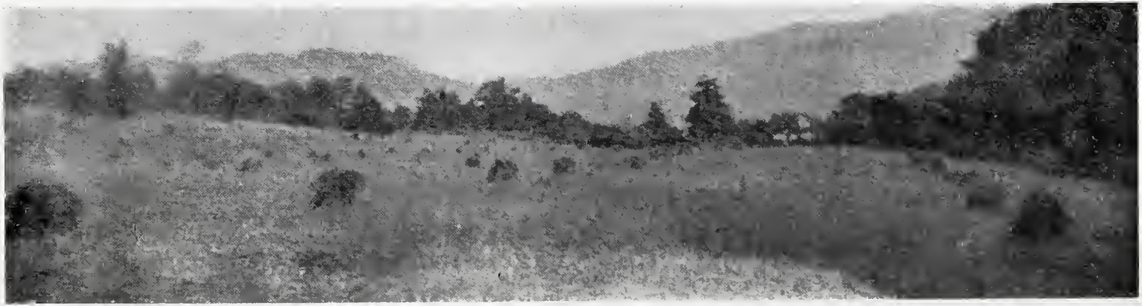
**Finders.** View-finders, sometimes useful in street photography, are dealt with on another page in connection with marine photography, in which their employment is a necessity.

**The Ray-filter.** The *ray-filter* is a very valuable aid in outdoor work and deserves a wider appreciation than it has so far secured. As its name implies, it is a light-filter which absorbs from the light reaching the lens certain rays which interfere with the correct color-values, clouds and perspectives of pictures made outdoors. It also prevents over-exposure of the sky and is a simple remedy for halation, which can-



SOLITUDE. Robt. S. Redfield

*Accepted by the Salons at Brussels, Paris, and Philadelphia* 1898



OUTDOORS. Joseph T. Keiley

not occur when a ray-filter is used. Another valuable end it serves is that of absorbing the haze which obscures the distance in mountain views, enabling one to secure a clear image of distant objects. The *ray-filter* as obtainable commercially consists of two thin pieces of optical glass with plane and parallel surfaces, separated by a glass ring which forms a cell containing a solution of potassium bichromate. It is enclosed in a brass or metal ring which protects it, and in use, it is fitted to the front or back of the lens-tube.

**Plates and Films.**

Whether plates or cut-films or cartridge films are to be used, must be left to the choice of the individual. If plates are used they should be backed for all subjects strongly illuminated. Subjects showing strong contrasts of color should be taken with isochromatic plates; for landscapes without figures Cramer's *slow isochromatic* will be found to give good results and require no color-screen. In photographing against the sun non-halation plates are indicated. For the traveller, for securing quick successive pictures of subjects with movement, and for general work on plates less than 5 x 7 inches, cartridge films have distinct advantages, the closing and changing of the plate-holder being done away with. For street views and scenes with movement, extra rapid plates such as Seed's 27 *Gilt Edge*, Cramer *Crown*, Lovell 50 *Ex* or Hammer's *Extra Rapid* are all equally reliable in speed and quality. Of these things, however, the reader will gain experience in his work, learning to adapt his methods to his material and apparatus with a liberal allowance for the vagaries evident in both.

**Landscape.**

We will now suppose the reader to be familiar with his outfit and eager to begin work. Let us take up the simplest branch of outdoor photography—the landscape. The desirability of getting pictorial photographs of nature rather than mere map-like records has already been mentioned. In order to do this we must seek not only the best time of day for any given scene, when the light and atmosphere are appropriate to the scene, but we must learn the few points which give pictorial value to a photograph and differentiate it from the mere view. These points are gathered together in one word—composition, of which the first step is selection of the point of view from which the picture is made. Composition in outdoor work has been explained times without number, but nowhere more clearly or more briefly than in a recent illustrated lecture by Mr. W. J. Morgan, before one of the English photographic societies. I will give the substance of his paper and some of the illustrations, for which I am indebted to the *Amateur Photographer.*

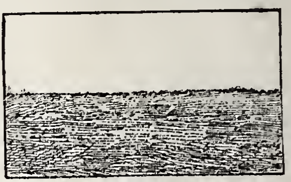


Fig. 1.

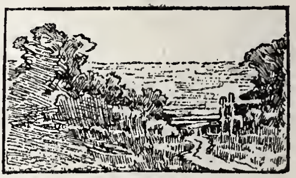


Fig. 2

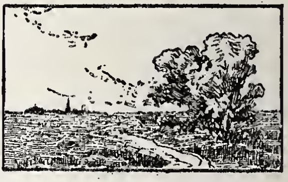


Fig. 3.

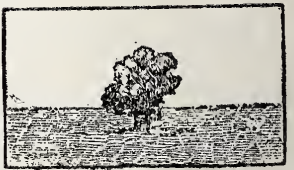


Fig. 4.

**Composition.** "This matter of selection is one that I am afraid is sadly neglected by the amateur photographer. The dangerous facility with which he can take his picture tempts him, and he gets into a careless habit of taking any amount of pictures, or rather exposing any number of plates, trusting that some of them will come out well. I have heard photographers boast of having exposed so many plates on a journey, or on a Saturday afternoon excursion. The boast should rather be, I have taken so many good pictures. Care in selecting the best point of view, trying thoughtfully to find out which is the best point to take a subject from, is of more importance also than the obtaining of sharpness or detail. Perfection in a negative will not make a bad composition, a bad arrangement, into a good picture, or into a picture at all. You may ask me, What is a good composition? Well, it is difficult to describe. A good composition is one that gives a feeling of satisfaction, a feeling of completeness, one that thoroughly conveys to the mind the best *sentiment* of the subject portrayed. Are there any rules for composition? Yes, many; many of them complicated and absurd, and I am glad to say now becoming obsolete; but there are a few simple ones that can easily be learnt, and will serve as guides to beginners. But, remember, the great rule for composition is to continually be striving to improve your own knowledge of what is beautiful by the study of good examples from the best artists, and thus get to know how to select for yourselves the best from the manifold beauties of nature.

"Now we will start on some of the rules. An important point or feature in a landscape is the horizon line; that is, the line where in a broad, simple landscape the ground meets the sky.

"We will take the usual shape of a 5 x 7 plate.

"Never get this horizon line exactly in the centre, dividing the picture into two equal parts, as in Fig. 1.

"I may tell you at once that there are exceptions to all these rules, and good pictures can be produced with the horizon line in the centre, but I am speaking now generally. The horizon line should be *one-third* from the top or one-third from the bottom. One-third from top is best for near foreground subjects, hedgerows, or stile and path through fields, as in Fig. 2. One-third from bottom for wide, extensive views, commons with trees, and village church in distance, as in Fig. 3. This kind of composition requires, to make it complete, a sky; and then, of course, comes up the question, Is the introduction of a sky permissible, the printing in of a sky from another negative? I certainly say yes; but you must be careful to print in a sky that, at any rate, looks as if taken at the same time of day, and one that is suitable to the subject. Don't attempt to manufacture a sky, either with cotton wool or otherwise, and do not print a favorite sky into too many pictures.

"The next most important part in the composition of a picture is the placing of the principal object of interest. Never place it in the centre of your picture, as in Fig. 4, nor close to the edge, as Fig. 5. The rule says, place it about two-fifths from the right or left hand side (Fig. 6). This principal object will not always be so easy to find as in these simple sketches. It will not always be the largest object in your picture, but the one of the most interest; the one to which you wish to attract the eye of the spectator. It may be the end of a road, the turn in a road, with just a figure or a cart to give life, or the gleam of life on the bend of a river which catches the eye. To especially mark it out as interesting you must endeavor to get the lines of your picture to converge toward it. This brings us to the composition of line, a more complex subject. But the rules are very much the same. We will take a hill-side with a bend in the road under the trees. Never get your lines running up the centre of your picture (Fig. 7). Get them running to one side or another (Fig. 8). This will apply, of course, to river subjects (Figs. 9 and 10).

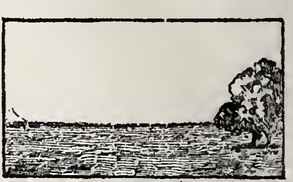


Fig. 5

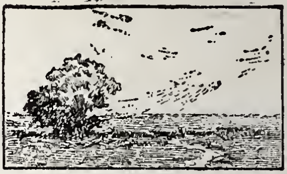


Fig. 6.

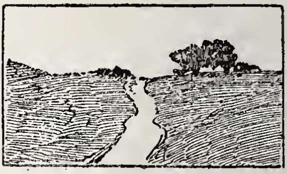


Fig. 7.

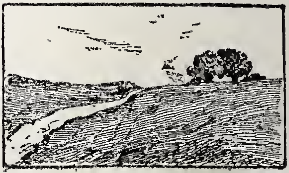


Fig. 8.

**River Subjects.**

"This study of line, and striving to get good, sweeping, graceful lines in your pictures, can be carried to any extent. The simple rule is, however, let your lines converge on your point of sight or interest, and do not have that point in the centre of your picture. This we shall treat of again in our next section.

**Buildings; Lanes; Street Scenes.**

"When trying to get a good picture of a house do not get right in front of it, and feel that you must get it all in, or it will

UNLOADING THE CATCH. Myra Albert Wiggins

A SILHOUETTE. Robt. S. Redfield

come about as artistic as the primitive drawings we used to make on our slates at school (Fig. 11). Get a little on one side and put the house in perspective (Fig. 12). This same rule applies to street scenes. Never get in the centre of the street or road. In these days of wild lady cyclists and motor-cars you are not likely to do this if you have any respect for your life and limbs, but artistically it is well to avoid this kind of composition (Fig. 13). But get more the character of Fig. 14 by taking up your position more on one side.

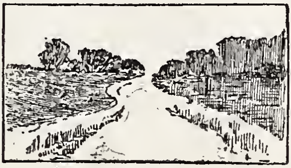


Fig. 9.

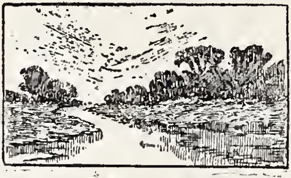


Fig. 10.

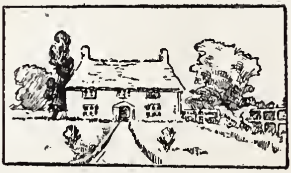


Fig. 11.

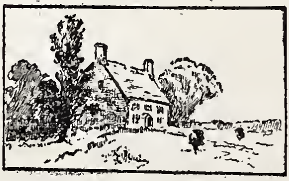


Fig. 12.

**Sentiment in a Picture.**

"In this kind of subject, not only in views down streets, but in narrow lanes and deep valleys, a difficulty comes in, in the form of the V-shaped piece of light at the top of the picture (Fig. 15). You must endeavor to break this up with some irregularity in the sky-line, a tower or a chimney in the street view, or a tree or bold rock in a lane or valley. These are all simple rules, and I have seen whole batches of photographs, clever from a mechanical point of view, rendered altogether uninteresting because of the absolute lack of any knowledge of the simple rudiments of picture-making. As a simple aid to help you in arranging your pictures before exposure, it is useful to divide your focusing screen by ruled lines as in Fig. 16 ........ But beyond these rules there are many steps to be taken in picture-making. If you have an evening subject to take, breadth, simplicity, quietness, even solemnity must be the qualities striven for; and it would be well, after having exposed your plates, to sit down and quietly study your subject, absorbing into your mind as much as you can of the beauty and effects of the scene. Note how the rising mist is drifting over the distance, clothing such and such a portion with a filmy veil, leaving the nearer portions to stand out in broad and simple masses. Note these things, and then, when developing your plate, bring into play all your knowledge of the technical resources of photography to reproduce them—reducing this point, strengthening that, and carrying this on in the printing and toning of the proof, remembering always that the final proof is the important part of your work to bear in mind; not the minor details of how it has been done, but what has been produced. Strive not merely for technical and mechanical perfection, but strive earnestly to catch some of the finer and more fleeting beauties of nature. Then, if you can succeed in doing this you will have learnt a goodly portion of the higher part of the composition of a picture."

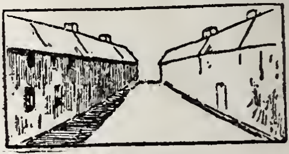


Fig. 13.

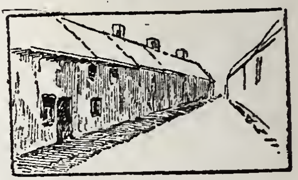


Fig. 14.

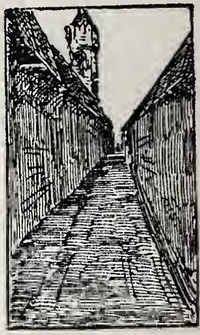


Fig. 15.

**Sunsets.** Many scenes which have little interest or pictorial value in the broad light of day acquire a certain picturesque quality as evening comes on, more especially if the sun sets over them with a few clouds in the sky. Under such conditions the most uninteresting creek or marsh may become a subject for the camera which, if properly treated, will delight the eye. The making of these sunset pictures is comparatively simple if we are familiar with what has already been said about composition in landscape. Two sorts of sunset pictures suggest themselves; those which are distinguished by their quietness, where the sky is only broken by low-lying clouds near the horizon; and those presenting bold effects of light and shade, where the clouds are marshalled against each other, now opposing, now melting away in ever-changing forms. Naturally the sky is the key-note to success in this work.

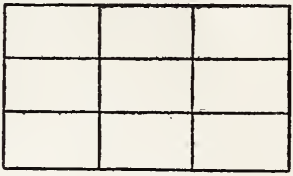


Fig. 16.

The foreground requires care and should be chosen to give the effect of retirement to the distance and sky. Often we will be obliged to photograph against the sun, so that backed plates will be necessary unless we work with films. Isochromatic plates and a color-screen will, however, give the best effects. The exposure should be brief and the development restrained to avoid too much harshness or contrast. Very effective pictures of sunsets, commonly known as "moonlight views," may be secured when a large sheet of water, such as a lake, is available; here the exposure should be made with the sun hidden behind a mass of cloud. In attempting this sort of work, remember that you are striving to record in black and white a scene full of color. A pair of blue spectacles, worn in selecting sunset views, will enable you to avoid the deception of color and show the scene as it will appear in the print.

**Moonlight Photographs.** Photographs may be made by the light of the moon when it is full, but are interesting chiefly as curiosities. The exposure depends, as a matter of course, upon the general illumination present at the time. Sometimes an hour will be sufficient to secure all the detail desirable in the view; at other times three or four hours must be spent, the lens being covered while clouds are passing over the moon. Mr. W. B. Bolton, speaking of his experiments in this direction, says:

"For the class of subjects that lend themselves most readily to moonlight photography, both as regards satisfactory photographic rendering and the production of artistic results, the difficulties arising from the selection of time are probably not great. I refer to the class of open subjects that have been so popular of late years, in which it is a question whether landscape or sky forms the most important part of the picture. A wide expanse of country in which there are no prominent objects to form masses of heavy shadow seems to offer the same opportunities for artistic treatment as a moonlight, as it does as a twilight or gloaming. The weak point with close subjects is that in working by moonlight there are literally no half measures, it is either light or shadow, and while where it is light it may be as light as day in the photograph, where it is shadow it is uncompromisingly black. It has to be learnt and to be constantly borne in mind that we are dealing almost solely with the direct moonlight, and that the reflected light which does the best part of the work in a daylight picture is here practically absent. I may make an exception, if exception it be, for I was speaking of moonlight. When the moon becomes obscured by clouds, the reflection from any light objects—a dusty or frosty road, for instance—or the diffused light from the clouds will work into the shadows and bring out more detail in a short time than a very prolonged exposure in full moonlight would do. In fact, so utterly different is the effect of the clear and the veiled moon, that one night last month, in the total absence of moon, I was tempted to expose a plate simply on account of the flood of detail visible to the eye everywhere. Half an hour's exposure gave an apparently more fully exposed negative than I should have got if the moon had been shining, but the image was so uniformly flat that it was worthless for any purpose."

In developing negatives made by moonlight a developer should be chosen which will not fog or stain the plate, and care should be taken to avoid clogging the brilliantly lighted portions while getting all possible details in the shadows.

**Rainbows.** Photographs of rainbows are strangely rare, although it is not a difficult subject. When the conditions of atmosphere are favorable, and one has an isochromatic plate ready in the camera, the rainbow may be secured with a lens working at *f*/16 and $\frac{1}{10}$th of a second's exposure. The development of the negative must be directed to secure the rainbow only, all other features being subordinated.

**Clouds and Skies.** Perhaps the greatest defect in the average amateur photograph is the absence of clouds or sky of any kind. Usually the sky space is left blank and white, and consequently much of the feeling or sentiment of the scene is lost. The fact that the sky is invariably the key-note to a scene should urge amateurs to try to remedy this defect in their work and, where it is not possible to secure sky and landscape in one negative, to have at hand a few dozen cloud negatives from which a suitable sky may be printed in upon this or that landscape.

The simplest way of securing the clouds together with a scene is to use a ray-filter or "bichromate cell," such as has been described among the essentials for work outdoors. The bichromate solution should be of such a depth of color as to increase the exposure about four times, so that the actinic value of the sky is equalized with that of the landscape and each acts proportionately upon the sensitive plate. Isochromatic plates give the most satisfactory results, although the double-coated "non-halation" plate will always give a better result than the ordinary plate. Another method of securing sky and landscape together, where a ray-filter is not available, is to expose two plates in quick succession without moving the camera, one for the general landscape, one for the clouds alone. In few cases will the lighting have changed to any appreciable extent during the few seconds which must elapse between the two exposures. But to get the whole picture on one plate is not so difficult as at first sight it may seem, and if this can be done, much trouble is saved in printing. Much may be done by careful development. As soon as the clouds begin to show, the developer may be poured off, the plate washed and the sky may be painted over with a brush charged with restrainer; thus a check will be put upon this part of the picture when the developer is again poured on, and the process of pouring it off, washing the plate, and applying the restrainer locally may be repeated as often as thought requisite. And even if the sky is found too dense to print well, the finished negative can be locally reduced by any of the well-known methods, and the blocked up detail in the clouds recovered.

Often, however, the scene photographed is cloudless, the blue of the sky giving a tint of sufficient depth to satisfy the eye. This tint, of course, disappears in the development of the negative, and we must print in a suitable sky. To this end we want a number of cloud negatives and should take every chance to secure these during the year, in order to have them ready for use when needed. The subjoined hints on photographing clouds for use with landscapes will be found to comprise all the information needed on the subject. They are taken from Todd's *Practical Reference Book :*

" It is not necessary to know each special variety of cloud by name, but the photographer should certainly be able to classify them under three headings. First, the thin, feathery clouds, popularly known as " mare's tails," but scientifically called cirrus ; secondly, a more solid form, running in straight lines, known as stratus, though in this class we may include all medium-tinted clouds ; and third, the cumulus or thunder-storm variety. For anything but heavy cumulus clouds, color-sensitive plates should be used, and even for thundery clouds they give better results. With an ordinary plate it is almost impossible to secure cirrus clouds, for the light blue sky is as active, photographically, as the white cloud ; so one must use a color-sensitive plate, and in addition a very deep yellow glass screen, or a saturated solution of bichromate of potash in a cell placed preferably behind the lens. For medium dark clouds a lighter color screen should be used, or a bichromate solution, as with cirrus clouds, but diluted with an equal volume of water. For cumulus clouds a very light color screen should be used, or the bichromate solution diluted with three times its bulk of water. The best effects of cloud-lighting are got shortly after sunrise or before sunset, and not in the middle of the day. The best season of the year is in the spring, when the weather is variable, and occasionally in the autumn. When clouds are photographed for pictorial purposes, such as combination with a landscape, the part to be taken should be near the horizon, and on no consideration should those overhead be selected. Medium-tinted, unobtrusive clouds, grouping themselves into some definite form, are the best for adding to a landscape picture, not the heavy rolling cumulus variety so often favored."

The plates used for photographing clouds should be of medium rapidity, and the exposure should be merely a fraction of a second with stop *f*/22 or *f*/32, with a slow-shutter or quick-cap movement. The camera should be level or almost so, and hence we must seek our cloud negatives from an elevation where we can have a big stretch of sky (with very little landscape) without tilting the camera. If we can get our clouds from the seashore, so much the better. It must not be forgotten that diffused definition is more desirable in cloud negatives than sharply defined forms. The common-sense of this will be evident if we observe the softness of the clouds in nature, especially when viewed in the far distance. It is also advisable to make a note with each cloud negative, giving time of day and year, position of sun and aspect. This mem. should be written on the envelope enclosing the negative so that its details may be available when the negative is to be combined with a landscape.

**Marine Photography.**

Happy the camerist who can spend a few weeks in every year within sound or sight of the sea. Shore, and sky, and sea —in these the photographer with an eye for pictorial effect may find a veritable paradise, as fascinating in the variety of its beauty and interest as in the peculiar difficulties these offer to his skill, and a field of work comparatively untilled, which, day by day, gives back pleasures a hundredfold for the patient enthusiasm which it demands from all who seek its victories.

It is surprising to note how rarely one comes across a photograph of the sea which does not soon become wearisome. And yet one never wearies of the sea itself, with the wonderful combinations of sunlit skies and straggling shore-lines which may be found in infinite variety along the coasts of the world. Have we not proof in this that the amateur in quest of subjects has not yet appreciated the sea, nor given to it the thought it deserves as a treasure-house of themes? The life of the sea and its coasts, its craft and harbors, its everchanging moods and aspects are all desirable camera subjects, and offer a delightful change from the eternal landscape which has so long dominated the amateur's portfolio. Wherefore, to set my readers thinking along these lines, I counsel them to embrace the first opportunity to look over the series of seascapes which have made Worsley-Benison's name known among lovers of the sea, or the yacht-studies of Bolles or Stebbins or Child, Jas. Symonds or West & Sons. The delightful bits of coast-life which Sutcliffe has published are also most persuasive. If these do not move the heart as the eye passes over them in review, stick to landscape and be happy.

**Apparatus.** A very few words will suffice concerning apparatus for photography at sea or along the coast. From personal experience with tripod and hand-cameras, I very much prefer the latter as more convenient to handle under widely different conditions, and also as demanding less care and attention where one's mind is occupied with the subject. For some subjects, such as seascapes of pictorial interest taken from the shore, a tripod-camera is perhaps more satisfactory, but one can do so much with a hand-camera, as they are made now-a-days, that it is hardly worth while to add the burden of a tripod for occasional use. When a tripod is carried, it should be fitted with ball-and-socket joint, and the camera loosely fixed to the stand, to permit freedom of movement necessitated by the nature of the subject or other conditions. Among hand-cameras almost any variety will be found equal to ordinary requirements, although the better the instrument the better the results will be, as a rule. The ordinary "fixed-focus" box will give very satisfactory results if properly handled; for work of the more difficult sort, however, a twin-lens camera, such as the "*N & G*" or *Ross*, or an instrument giving a full-size finder with a single lens, such as the *Reflex*, will be preferable. Whatever camera be used, a good finder is essential, and this should preferably be of the kind which permits one to see the view from behind instead of being obliged to bend down over the camera. Such a view-metre was illustrated at page 114 of *Hand-camera Work*. Symonds, in photographing yachts and other craft from a sailing boat, uses a very simple form of finder illustrated in Fig. 17. The outside lines represent a stout wire framework, and the dotted lines are of finer wire. This finder may be attached to the front of the camera, and viewed from a peg inserted at the centre of the back of the camera. When so viewed the outside lines represent the plate, the lower horizontal line should coincide with the water-line in the view, and the central perpendicular line gives the centre of the plate. The whole of the yacht or vessel photographed should, of course, be included between the two outside dotted lines. A central horizontal line is shown in the cut, which is the central perpendicular when the camera is used for upright views. This finder is most useful when it is desirable to follow the course of a vessel, awaiting a suitable moment for exposure. H. P. Robinson uses a still simpler finder, shown in Fig. 18. This consists of three lines engraved with a blunt tool on the top of the camera box; one directly down the centre, the other two from E to the opposite corners, these diagonal lines being adjusted to coincide with the angle of view included by the lens. By placing the eye at E and sighting down the central line, you get the centre of the picture, and by looking down the diagonal lines you see how much of a scene is included on your plate. Another "rear-view" finder is the *Globe Sighter*, shown in Fig. 19, which explains itself. For surf photographing and general seascape work along the shore, the usual form of finder, such as the *Iconoscope*, or the *Poco View-finder*, both described at page 113 of *Hand-camera Work*, will be found more convenient. A flat, circular level should be fixed at the

Fig 17

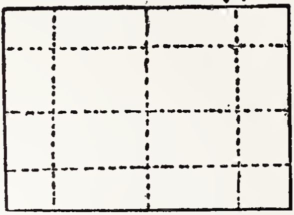
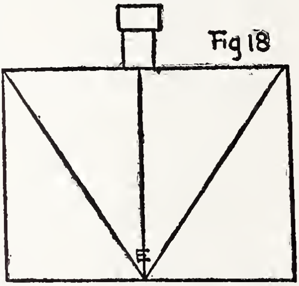


Fig 18



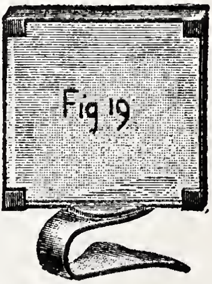


Fig 19

top of the camera-back unless the finder includes a means of levelling the instrument. The camera should have a rising front, with lateral as well as vertical movement, so that the foreground may be easily controlled.

**Lenses.**

In the matter of lenses an ordinary single view lens will give thoroughly satisfactory results, and there is no need to look further until this is found to lack in capacity. A good rectilinear, such as Darlot's *Rapid Hemispherical* with a working aperture of *f*/7, will be found most generally useful; one with a focal length longer than the base of the plate should be chosen. Where two lenses are available, a long-focus objective for general use, and a short-focus, wide-angle lens for occasional work, such as yachts at short range, may be carried with advantage. For work including extremely rapid motion, such as yacht-races photographed from a tug, speed trials of war-ships, or the photographing of projectile tests at sea, the most rapid anastigmat and the quickest shutter obtainable will be needed. The lens should invariably be shielded from dampness or flying spray when working near the sea. This can be accomplished in some measure by the use of a shutter working in front of the lens such as the *Thornton-Pickard "T. & I."* When a diaphragm shutter is used, as will generally be the case in this country, the lens should be protected by a piece of oiled silk large enough to cover both lens and shutter. This may be readily removed before actual use of the lens, and should be replaced after the exposure has been made. It is well, also, to rub a little oil over all the metal fittings of the camera to prevent rust, which is a frequent annoyance when working at the sea-shore. Since there is frequently considerable color-contrast when working near the sea and it is frequently desirable to include the sky with the subject, a color-screen will frequently be found valuable to subdue the excessive intensity of the blue rays. A weak solution of bichromate of potash gives perhaps the most useful color-filter for this purpose, and the *Ray-filter* made by Bausch & Lomb is perhaps the most convenient form of screen. A cheap filter for occasional use may be made from a piece of gelatine tissue of a light yellow color, such as confectioners use for the wrapping of *bon-bons*. This should be fixed to the back of the lens-board, behind the lens. It should not be forgotten that the use of even a light yellow screen necessitates an exposure fully four times as long as that required without a screen. This increase of exposure depends, of course, upon the strength of the dye-solution or bichromate used, and must be determined by experiment.

With regard to plates or films for marine photography, the trend of opinion is in favor of films. These do not need backing as plates do, to avoid halation, and are handy in many ways apart from their light weight and convenience of handling. Thus, in photographing passing vessels from a steamer or boat, a roll of film will enable us to get several views in quick succession where the chance would be lost if one had to change plate-holders. Or if we want two or three views of a yacht, as she approaches, passes, and recedes, with a double plate-holder we may manage to get the first and third, but the second will be gone before our second plate is ready. And in this quick shutting of the plate-holder and changing, one is liable to insert the slide carelessly and so admit light to the exposed plate. A magazine-camera for plates, or cut films, will be found almost equally serviceable. For shore work, plates, backed, non-halation, or isochromatic are preferable, although roller films have advantages here also, especially in photographing surf where the wave-forms are apt to assume their most desirable form just after we have exposed our plate.

To roughly classify marine photography we may divide it into the photographing of yachts or vessels at sea, surf or wave photography, and seascapes, these latter embracing daylight work and special effects such as "moonlight" or "sunset" views. Beyond these we have work ashore, coastwise scenes, with life and without; harbors and shipping. Each class requires different treatment, so we will consider them each under its own class.

**Yachts.** Yacht pictures can sometimes be secured from the end of a pier or dock, but the most successful results, showing life and motion, are usually secured from the deck of another boat which is navigated so that the most desirable picture or view-point is obtained. When it is possible to work from the deck of a steamer the manipulation of the camera, even on a tripod, does not present much difficulty. When one has to work from the deck of a boat or tug, as is often the case at regattas or races, success is not so easy of accomplishment, and depends as much upon self-control as upon photographic skill. A good deal depends, too, upon one's knowledge of the best views of this or that class of craft under varying circumstances, for a vessel viewed from different view-points presents widely different aspects, and every kind of sailing craft has its own peculiar characteristics, which should be secured in the picture. A broadside view rarely gives the most favorable impression and is difficult to secure, because the speed of the vessel is more difficult to contend with from this view-point than from others. A three-quarter front view, on the other hand, will generally offer good curves and a pleasing *ensemble*, with plenty of life and "go." When a yacht approaches, bowfore, with the water beaten to a froth beneath her bow, a very satisfactory result may be secured if one has a steady hand and knows just when to release the shutter. When first seen on the finder an approaching boat seems to move comparatively slowly, but when within hailing distance she will increase in size and seem to suddenly fill the view with her canvas. When to expose in such circumstances can only be learned from experience and the use of an accurate finder. The novice should not forget that the successful yacht-studies seen in the shop windows represent many failures, even if they come from workers famous in this specialty. Steamships, or sailing vessels with abundant canvas, usually give the best view three-quarter front; sometimes a broadside view will be pleasing if we can have a cloudy sky behind to throw the sails into relief and give a sense of atmosphere. A rear view of a steamship will rarely be satisfactory, but if we get a full-rigged sailing vessel stretching all her canvas against the sun, a charming semi-silhouette effect may be secured, adding sentiment to the picture. This effect is emphasized if the sun be low and the sky marked by horizontal lines of cloud indicating repose. Pictures of small vessels lying at anchor in still water, such as may often be made from the wharves or docks of a harbor, are very pleasing if treated pictorially. The lighting of the subject is here a matter of importance, and this should be so managed that shadow effects on the water are made to help the composition.

**Illumination of the Subject.**

At regattas or races the lighting of the various vessels, the time of day when the photographs are to be made, etc., are beyond the photographer's choice. He must take his subjects as he has the opportunity. When a race is followed in a steam tug, however, much may be done in securing a view-point from which the subject is favorably illuminated. The morning and the late afternoon are the best times for work on the water. To secure good pictures at noonday, with sun overhead and a clear sky, is almost an impossibility. Under such conditions the white sails are lost in the light blue of the sky, and the sea, being a powerful reflector of the sunlight, will appear a harsh white mass in the print. By watching until the boat takes such a position that both sides of the sails are seen in part at once, a better effect may be secured. Straight black shadows thrown by one sail onto another should be avoided when possible as tending to rob the picture of the natural roundness of the subject. The choice of position from which to photograph must largely depend upon the direction of the wind with relation to the position of the sun. If the light can be had from an angle of 45° to the right or left of the camera, the subject will show its normal modelling, and a pleasing amount of contrast will be gained. In many instances, however, the only course is to make the best of things as they are.

The question of exposure in yacht photography is not as difficult as might be imagined provided we can fairly accurately gauge distances and know the focal length of the lens we use. It is difficult indeed to under-expose, so intense is the illumination given by sea and sky. What is needed is to ascertain the longest possible exposure which may be given without blur or movement in the picture-image. The rule for ascertaining this is to divide the estimated distance between object and camera, in inches, by one hundred times the focal length of the lens, in inches. Then divide the speed at which the object is travelling, in feet per second, by the result. The answer is the longest exposure permissible in fractions of a second with the subject travelling broadside to the camera. When the object is travelling at an angle toward the camera, the exposure (previously ascertained for a broadside view) may be lengthened threefold. This indicates that when an attempt is made to photograph any object moving at high speed, an angular viewpoint should be chosen. In photographing yachts or low-lying vessels from a wharf, care should be taken that the point of sight is not too high, a distance of eight feet from the water being about correct, otherwise your view will show too much of the deck of the vessel photographed, after the manner of a bird's-eye view.

**Surf and Waves.**

Surf and wave photography is somewhat different in its requirements. Mr. Osborne I. Yellott, who has done some good work in this direction, relates his experience as follows: "First get to know the speed of your shutter and the values of your lens-stops. This will enable you to calculate your exposures with ease.

"An exposure-metre is a good thing anywhere, but is almost a necessity at the sea-shore, where the values of light are particularly perplexing. Exposure tables are of little or no use, owing, among other things, to the reflection of the sun's rays on the water. One I had with me for the purpose of testing called for 1-48 sec. at 8 A.M., bright sun. My metre called for 1-310, and I gave the plate 1-400—that is 1-100 with the *f*/32 stop—and am now prepared to agree with the metre but by no means with the exposure table.........

"Before making an exposure decide what you are going to take. Study the breakers. Determine beforehand whether you wish to take them as they rush in before beginning to break, or just as the crest breaks, or on their downward rush, or after they have struck the beach and rebounded in white and glistening spray and foam. If you wait to take a breaker until it is at its best, you won't get it, because it isn't at its best long enough for you to realize that fact and press the bulb. It frequently happens that it is better the second after you took it, but that is only one among the many disappointing features of surf photography. Having made up your mind how you are going to take a breaker, the next thing to do is to get your camera ready. Experience teaches me that with a rapid shutter the closer you are in, the more satisfactory pictures of surf forms you will get, the minimum distance depending entirely upon the speed of your shutter. Experience also teaches me that when taking the surf at close range a bathing-suit is a convenience if not a necessity. A very important point is to get your horizon level on the ground glass, otherwise you may have to trim away the very best part of your print.

"Having decided at what stage you are going to take your breaker, notice the point in the water where one is when it reaches that stage, and then focus with the *f*/8 stop on the water at that point. Test the focus by watching two or three breakers on the glass, and when you think it is about right, adjust the diaphragm until you have cut the light down to the proper amount. In this connection it is well to remember that while cutting the lens down serves primarily to reduce the amount of light entering the lens, it also gives sharper definition. Cutting it down to the *f*/32 stop and smaller has the effect of bringing everything in focus beyond the point actually focused on, and while it has a tendency to bring objects in focus between the camera and the point focused on, yet that tendency is quite limited. If, therefore, you want the water in the foreground as well as the breaker in the middle distance sharply defined, it is well to focus on the former; cutting down the lens will then bring the breaker into focus. But there are two other facts to be taken into consideration in this connection: first, that the tendency of moving objects to appear blurred in the negative is increased as they are nearer the lens, and second, that a longer exposure, one-half more, is necessary for objects within fifteen or twenty feet of the camera.

"Your camera being ready for action, the shutter set and slide withdrawn, the next thing to do is to wait, being careful to keep your lens covered in the meantime. Wait for the breaker to come just as you want it and then take it. It is much better to wait fifteen or twenty minutes for the right one than to spend as much or more time developing the wrong one. The length of exposure depends upon the light, your lens, your plates, and a few other things. Most writers dismiss the subject right there. But I have always thought that the subject of exposure was capable of a little more definite treatment, so for the benefit of those who may think that my pictures look a little more like the surf than some they have taken, I will state the exposures I gave some of them. They were all taken during the last ten days of August and first ten of September, with the lens and stop mentioned, and these used with the Cramer *Crown* plate. I do not claim the exposures were right, but they were calculated by my exposure-metre, and it has done me good service inland. Here are some of them :

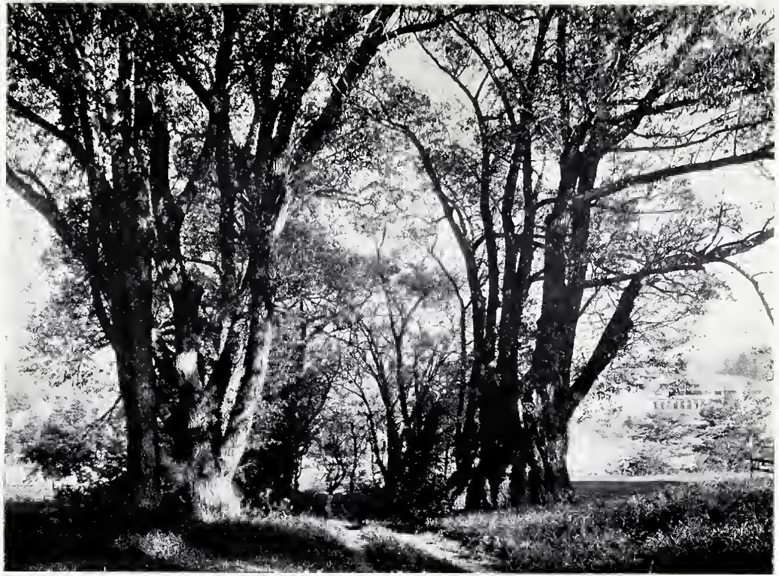
| | | | |
|---|---|---|---|
| 5.45 A.M. | Sun behind clouds.................. | 4 stop, | 1-50 sec. |
| 7.00 " | Fairly bright sun...................... | 32 " | 1-50 " |
| 8.00 " | Bright sun in front of camera........ | 32 " | 1-100 " |
| 9.00 " | Cloudy.................................... | 8 " | 1-100 " |
| 11.30 " | Bright sun.............................. | 16 " | 1-100 " |
| 12.00 M. | Bright sun.............................. | 32 " | 1-100 " |
| 4.00 P.M. | Bright sun.............................. | 24 " | 1-100 " |
| 6.00 " | Fairly bright sun.................... | 8 " | 1-50 " ." |

**Sea and Shore.**

For general seascapes and shore views the extremely rapid plates and quick shutters may be laid aside with advantage, the slowest movements of most shutters being too quick for the average open sea view. For these a speed of $\frac{1}{6}$th to $\frac{1}{20}$th of a second will meet all requirements, and for a large proportion of the exposures an isochromatic or slow ordinary plate, well backed, will give the most satisfactory results. Of course, in views made under such conditions, we cannot expect wave-studies of microscopic definition, but we are not looking for these now, preferring a certain lack of definition with more than a broad suggestion of movement. We may attempt now to compose pictures in which the sky, the sea, and the various land-marks along the shore shall all contribute their share toward securing pictorial effect. Three hints may be given as of general application. Look after your foreground that it be interesting, relieved, if desirable, by the judicious placing of a dark mass such as the hulk of an old boat, or a clump of stunted shrubs, to give distance to the horizon. See that the horizon is absolutely level, and not at the centre of the view on your plate ; it will always be more pleasing if placed at one-third or two-thirds of the width of the plate. Be careful to see that you have *one* interest in your picture ; do not let sea and sky clash, or foreground and middle distance. Arrange them so that the picture will have unity.

**Sunsets and "Moonlight" Views**

Among the most attractive of sea pictures are those which are taken about sun-down, when the fading light shimmers in fantastic forms over the restless face of the waters. Sometimes these are allowed to pass as sunset effects, which they are ; at other times the massing of the lights and shadows suggests moon-



THE WILLOWS. J. W. Black

*On Campus of Colby College, Waterville, Me.*

PRINCE'S CANAL AND WESTERN CHURCH, AMSTERDAM
L. J. R. Holst

light effects and, printed in platinotype or carbon tissue of appropriate tint, they are made to deceive the unwary as "moonlight" pictures. They are very simply made, either just before or after the sun has gone below the horizon, and are most effective with a calm sea and a few light, irregular clouds in the sky. An orthochromatic plate gives the best results. The broad masses of shadow are, of course, the result of under-exposure or under-development. In making such views the camera is pointed toward the setting sun and, at a moment when he is hidden by a cloud, or partly hidden, so that his intensity is considerably reduced, the brief exposure is made with a small diaphragm in the lens. If a vessel of some sort, or a floating wreck almost in-shore, can be secured so that its dark bulk breaks the play of sunshine on the waters, the effect is much improved.

Daylight scenes along the shore or of shipping in harbors do not call for special treatment except that a slow, backed plate will be found more useful than the usual rapid plate, and that the exposures should be considerably shorter than on landscapes inland. Roughly speaking, a sea view will be amply timed with one-twentieth of a second's exposure, but the exposure and development of a few plates, and the intelligent use of such helps as Wynne's *Actinometer* or the *Photo-Beacon Exposure Tables* will give the reader a fairly good idea of the exposures needed at different times of the day.

**Developing Sea Views.** In developing plates exposed at the shore, if the exposure has been made during the middle portion of the day, and the plate employed been fairly rapid, it will often be found useful to commence development with a solution containing a large proportion of pyro and bromide; indeed, double quantity of both, to that recommended as the normal developer for the plates used; this will insure getting sufficient contrast, whereas were the plates placed in a weak developer to commence with, it is often difficult to obtain negatives which will print satisfactorily.

When developing plates which have been exposed either in the evening or upon subjects containing not only sea and sky, but a rocky foreground in deep shade, then the reverse plan would be found to answer better.

In this instance we should find some portions of the plate upon which the exposure has been ample, but the shadow portions would require careful handling, if the resulting negatives are to prove capable of giving prints which show a full range of gradation, instead of large patches of practically unbroken black to represent what we know should be fully modelled shadows; or if in printing we only allow it to continue so far as to impress the details in the shadows, then the high lights either will not have shown signs of printing at all, or only to so slight an extent as to be useless, and therefore it is necessary, when contrasts in the subject are marked, to reduce to perhaps one-half the normal amount of pyro or whatever developing agent is used, and to use the developer in such a way as to give an extremely thin, delicate image, with every detail which had impressed itself upon the sensitive plate brought out, then having obtained full modelling, a strongly restrained developer may be applied.

**Snow-Scenes and Hoar-Frost.**

With the majority of amateurs the camera is put away when winter comes. This is a great mistake, for the winter brings an abundance of subjects fully equal to those obtainable at other seasons. Who has not marvelled at the beautiful transformation of an old garden effected by a fall of snow or a heavy frost over night. In making pictures of winter effects "bits" will be found more effective than extended or open views. Thus a hedge, or a single tree, will often make a more attractive subject than a stretch of road or a river view.

Too much should not be included on the plate; therefore, I should select a long-focus view lens for this kind of work. Artistic pictures can be made of the ends of old houses, railings, and branches and trunks of old trees; in fact, numerous factors will lend themselves which at other times would be ignored. As to the light, I think the best pictures are obtained in a diffused light, as bright sunshine produces hard negatives, but with careful development even those taken in bright sunlight can be made into very passable pictures. No hard and fast rules can be laid down for exposure, as the yellow light which usually prevails at this time of the year is very deceptive. But, generally, one-quarter or one-third the exposure that would be given for the view under ordinary circumstances will be found sufficient. But it is best to give full exposure, especially if dark objects, such as trunks of trees, etc., are in the foreground.

In taking hoar-frost scenes, not so many shadows are met with. The trees, hedges, etc., are covered with rime, and very little contrast can be had; therefore, the negative should be developed as hard as possible, so as to increase contrast.

Development should be effected with a very weak developer to bring all details out, and then it should be finished with the normal developer to obtain density. The result will then be a negative full of pluck and detail. The developer best suited for this kind of work is eikonogen with potassium carbonate as the alkali. Very slow, thickly coated or non-halation plates should be used, also a very small stop.

As a rule the early morning or late afternoon will be found most suitable for pictures of this class, the long shadows lying across the ground helping to break the monotonous stretches of white.

**Panoramas.** The making of panoramic pictures—*i.e.*, photographs of a scene including a much more extended view than can be included by the view angle of the average lens upon the plate—is an interesting field of work which the amateur in search of a change will do well to take up. Many special forms of cameras for panoramic photography have been introduced from time to time, but their bulk and price have militated against their popularity. Recently, however, the Eastman Kodak Company has brought forward a special form of *Kodak*, compact and reasonable in price, which should make the panoramic photograph more popular.

As a matter of fact, however, a special camera is unnecessary, and the most remarkable panoramas yet produced, those of Western canyons, by W. H. Jackson, of Denver, were made with an ordinary view-camera, and almost any form of hand-camera may be used with success. Much depends on the subject; street views, or scenes including long lines running parallel with the base of the view, are difficult; landscapes, including buildings, river views and the like, are comparatively easy to handle. The principle employed is to make a series of negatives, one after the other, embracing all desired of the scene, by swinging the camera round on the tripod until the portion included on each plate just overlaps at one side what was included on the previous plate. The exposures of each plate should be the same and they should be developed together to secure the same degree of density. A lens of medium angle and focal length, say 6 inches or 7 inches for a 4 × 5 inch plate, is most suitable for the work, and a strong tripod will be found useful. Having selected a subject, the camera is fixed so that the sun is over the right or left shoulder. If the shadows are coming toward you, begin the series of negatives required at the right-hand side of the view; if the shadows are receding, begin at the left. Having focused the first portion of the view, at the right-hand side, make two pencil-marks on your ground glass or back of the camera, each falling one inch from each side of the plate, and note well the object through which the left-hand mark passes. Tighten the camera-screw and give the exposure required, timing it carefully. Withdraw the slide or holder, loosen the camera on its tripod, and turn the camera to the left until the object in the view through which the left-hand mark on camera back passed in the first negative is so placed that the right-hand mark cuts it; focus the view, tighten the camera-screw, note what object the left-hand mark passes through, insert a new plate and make your second exposure. This operation is to be carefully repeated until as many different negatives have been made as are necessary to include as much of the scene as is desired. The print combining these negatives in one picture, so joined that the separate negatives do not show in the print, can only be obtained in a special form of printing frame, *Leigh's Combination Frame*, which may be had from photographic dealers. The various joinings are accomplished by skilful manipulation with vignetters or absorbent cotton at each end of the negative, so that the portions of the picture which overlap from one negative to another shall blend in depth and tone so as to give a uniform print.

**Photographing Moving Objects.**

The early ambition of all amateur photographers is to be able to make pictures including movement, such as express trains, athletic games, horses racing, and the like. In many instances success is beyond the range of possibility because of the limited speed capacity of the lens and shutter attached to the cheaper varieties of cameras. The chief thing to note in attempting work of this kind is that there is a minimum speed at which the exposure shutter must work in order to get a picture of a moving object free from blur or movement on the plate. This may be ascertained by dividing the distance of the object in inches by 100 times the focal length of the lens, also in inches. Then divide the speed at which the object is travelling, in inches per second, by the result. The answer gives the longest permissible exposure in fractions of a second. This is for objects moving at right angles to the camera; the exposure may be lengthened according as the angle diminishes. Thus, with the object 50 feet away from the camera, such as a horse galloping at the rate of 50 feet per second, and a 6-inch lens being used, the exposure needed for a broadside view would be $\frac{1}{600}$th of a second; if the horse is moving toward the camera at an angle of, say, 45°, the exposure could be increased to $\frac{1}{300}$th of a second. Hence, with all objects moving at a high speed an angular point of view should be chosen, viz.: An express train or cyclists racing should be photographed from a point well in front and at some distance from one side.

The highest speed capacity of the ordinary "fixed-focus" camera is $\frac{1}{25}$th of a second; of an average rectilinear, $\frac{1}{100}$th of a second; while with an anastigmat and a focal plane shutter an exposure of $\frac{1}{1000}$th part of a second may be given. As a guide for the exposure required for objects moving at various speeds I may give the following maximum exposures which suppose bright sunlight, a lens of 7-inch focus working at *f*/8, and the object to be about 50 feet away from the camera and coming toward it. For street views, $\frac{1}{20}$th to $\frac{1}{45}$th second; man walking rapidly or children playing, $\frac{1}{45}$th second; horse trotting, person cycling at average speed or a man running, $\frac{1}{100}$th to $\frac{1}{120}$th second. If the object is only half this distance (50 feet) from the camera, the exposures given should be cut in half—*i.e.*, children playing within 25 feet of the camera will require an exposure of $\frac{1}{90}$th second.

For all photographic work including rapid movement sunlight is essential, also rapid plates, and the best lens and shutter obtainable. A good finder is equally indispensable in order that the movement of the object within the field may be watched to ascertain the correct moment of exposure.

**Street Views.** For photographing in the streets of cities a hand-camera of the magazine type will be found most useful, and speediest in action as well as convenient in the plate-changing apparatus. It should be fitted with a rapid rectilinear of medium angle, or an anastigmat with diaphragm shutter, and as unobtrusive as possible in appearance. For success we must depend a great deal on the hand and eye being trained to calculate distances and the speed of moving objects. Extra rapid plates are necessary, and the exposures with a lens working at *f*/8, and the principal objects at 50 feet from the camera, will be from $\frac{1}{25}$th to $\frac{1}{46}$th of a second, more often the former. The development of street views is a ticklish matter, and a weak developer will be found most useful to start with. When the effect of the exposure is seen the developer may be modified to suit the needs of each case.

**Buildings.** Architectural photography is a big subject and must be reserved for a future number of THE PHOTO-MINIATURE, where it can have adequate treatment. A few words about photographing a building may, however, be useful to those who have to attempt such a thing only occasionally. The most pleasing photographs of a building are those taken from a position at a distance about three times the height of the building; where the distance is blocked by other buildings we must use a wide-angle lens, the rising front and swing-back of the camera, and do our best to avoid exaggeration and distortion. Care should be taken to show two sides of the building where this is possible, one side in the bright light, and the shadows should fall *toward* the camera. The aspect chosen must depend on the direction in which the principal façade of the building faces, north, east, south or west. The exposure should be generous to secure detail without harshness, but not too long, or the general effect will be flat and soft. Before exposure be sure that your camera is so balanced that the plate is absolutely perpendicular and parallel with the face of the building.

To photograph an illuminated building at night, proceed as follows :

Set up the camera in a house opposite, and, using a backed plate, give about two-thirds the correct exposure about an hour before dusk. The light should be even, with no sunshine, so as to cast daylight shadows, as of course that would give the thing away. Having exposed thus, cap the camera and let it remain until dark, when the necessary illuminations are in play. Now take the cap off again, and expose for about twenty seconds. An isochromatic plate is best, and the picture looks well printed in green carbon. If the night is a wet one, all the better, as the reflection of light from the pavements gives a fine effect.

**Animals.** For photographing animals, dogs, horses and the like, or the beasts in a zoological collection, the requisites are a rapid plate, a quick lens of long focus, a silent shutter, and plenty of patience. The rule for focusing should be to get the animal as sharply defined as possible, and to show all its parts, while in exposure the effort must be to give as long an exposure as possible, avoiding the "snap-shot" where it is not a necessity.

Gambier Bolton, perhaps the most famous of photographers of animals, says : "The perfect animal photograph should be free from heavy shadows (fully exposed), full of life, unrestrained and natural in expression and position ; all four legs and the tail should be distinctly shown, and the mane (if any), nostrils, eyes and ears, and hairs about them, should be microscopically sharp." With these hints and what has already been said on outdoor work, the reader will doubtless be able to approach this branch with successful results.

**Lightning.** Photographs of lightning flashes are obtained as follows, the work being most successful when the night is very dark : Focus the camera upon a very distant object, and then set it facing the point where the flashes may be expected. Use a rapid plate, stop the lens down to *f*/11 if a few details of the surrounding view are desired, or *f*/32 if only the flash is sought for, pull out the slide from your holder, open the lens and await the flash. As soon as this is past, insert the slide in the holder, change the plate, and repeat the operation with several succeeding flashes. Develop the plates slowly with a weak developer at first, and follow with a stronger solution to get density.

Here we must stop this very incomplete survey of photography outdoors. Almost every branch of work touched upon offers abundant material for a volume devoted exclusively to it, but I hope the few hints given may be of use to those taking up this or that field for the first time. Among the books which may be consulted for a further reading on the various subjects mentioned, are the following :

## BOOKS.

*Practical Reference Book of Photography.* By F. Dundas Todd. Part I. 104 pp. Illustrated, 50 cents.

*Photography Indoors and Out.* By Alexander Black. 1897 edition. Illustrated, $1.25.

*Practical Pictorial Photography.* By A. Horsley Hinton. Parts I. and II. Illustrated, 50 cents each.

*Art Photography in Short Chapters.* By H. P. Robinson. 137 pp. 50 cents.

*Sunlight and Shadow* and *In Nature's Image.* By W. I. Lincoln Adams. $2.50 each.

*Instantaneous Photography.* By Capt. Abney. 1895. 75 cents.

*Artistic Landscape Photography.* By A. H. Wall. 172 pp. $1.50.

*The Barnet Book.* By various writers. 300 pp. $1.50.

# NOTES

So many readers of THE PHOTO-MINIATURE have expressed their personal interest in the magazine, and a desire to help in its success, that we venture to repeat the three ways in which they may be of very great assistance to us. *First:* mention the magazine to your photographic friends; *second:* mention the PHOTO-MINIATURE when writing to its advertisers or to your dealer; and *third:* remember that back numbers are always obtainable. We are reprinting the first number (April: *Modern Lenses*) to meet the orders for it, which come in as quickly as the magazine becomes known. Very few copies remain of the second number (May: *The Pose in Portraiture*), and we expect to reprint that issue before the end of the month. Of the third number (June: *Hand-camera Work*) we printed an edition of four thousand copies, and therefore have sufficient stock for the orders of a few weeks. Forthcoming numbers of THE PHOTO-MINIATURE will be devoted to *Stereoscopic Photography*, *Orthochromatic Photography*, and other similar subjects about which all intelligent photographers should be informed.

Much praised as THE PHOTO-MINIATURE has been (and we can remember no magazine so cordially welcomed by photographers and the photographic press), it by no means fulfils our intention of what it should be. To this end we will appreciate the co-operation of our readers in making THE PHOTO-MINIATURE more widely known, so that a larger circulation and increased advertising may enable us to more completely realize our idea—to publish, month by month, at a nominal price, a simply written but reliable and complete monograph dealing with some branch of photographic work of popular interest.

❧

Philadelphia Photographic Salon, 1899 (second year). —The detailed prospectus, entry forms, etc., for those desiring to submit pictures for exhibition at the forthcoming Salon may be obtained from Mr. Robert S. Redfield, in care of the Photographic Society of Philadelphia, 10 South 18th Street, Philadelphia. Foreign exhibitors should apply as early as possible to Mr. A. Horsley Hinton, 1 Creed Lane, London, E. C., for all desirable information. The prospectus is printed in English, French, and German, and shipping agents have been appointed at London and Paris for the convenience of European workers. Exhibits and entry forms from abroad must be in the hands of the shippers not later than August 15th, while American exhibits are to be delivered in Philadelphia not later than October 2d.

The Salon, as previously announced, is under the joint management of the Photographic Society of Philadelphia and the Pennsylvania Academy of Fine Arts. The exhibition opens October 22d; no awards are offered and no charge is made to exhibitors. All pictures submitted must pass the rigid selection of a jury announced as follows: F. Holland Day, Boston; Gertrude Kasebier, New York; Clarence H. White, Newark, O.; Frances B. Johnston, Washington, and Hy. Troth, Philadelphia—an admirable choice among those competent for the task.

From the stand-point of pictorial photography the Salon ranks as the photographic event of the year in America, and we urge the readers of THE PHOTO-MINIATURE to give the movement their cordial support either by submitting their work for exhibition or by making known as widely as possible the work herein undertaken for the advancement of American photography.

◆

We have had many inquiries for Dr. John Nicol's forthcoming book, *The Right Road into Photography*, which was announced as published last December. Dr. Nicol informs us that his publisher has had trouble with the printer, but that the book will be ready early in July.

◆

The Art Academy of Cincinnati announces a class in photography as part of the prospectus of its summer term. Particulars may be had from the director, Mr. A. T. Goshorn.

◆

Mrs. Gertrude Kasebier, of New York, one of the most notable of women portraitists, will occupy Long Meadows, Newport, R. I., during the summer months, and intends to devote special attention to portraiture in the open air, with natural accessories. Mrs. Kasebier

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◆

A simple and practical pocket-manual on negative making, which has had an enormous circulation, is *Hammer's Little Book*, obtainable for the asking from the Hammer Dry Plate Co., St. Louis, Mo. The pages devoted to *Failures* should be invaluable to amateurs, while the *Formulas* include all the newer developers, etc.

◆

The May–June exhibition at the New York Camera Club comprised an interesting collection of 169 prints, the work of members of the club. Among the prints worthy of special mention were two clever portraits of a child, by W. E. Wilmerding; half-a-dozen interesting seascapes by H. A. Latimer; an impressionistic transcript of *Madison Square, N. Y., at Night*, by A. M. Lemercier; and a few capital *Wet-day Snaps* of New York streets, by John Beeby. The special exhibitions of this club have vastly improved of late months and we trust the effort will be well sustained as an educational feature the value of which is inestimable.

◆

Ross, Ltd., London, have issued a new model of their well-known *Twin-lens Camera*, which has a folding front, is less weighty, and only two-thirds the size of the original rigid model. It is fitted with a pair of the new Ross *Symmetric Anastigmats*, working at *f*/5.6. We also note, from the new Ross catalogue just received, that Messrs. Ross, Ltd., list a series of *Rapid Hand-camera* lenses of short focus provided with a spiral focusing arrangement adjustable for objects at all distances. These lenses should be extremely useful to those who desire to equip their hand-cameras with a finer lens than that originally supplied with the instrument.

◆

The Mobile (Ala.) Camera Club has closed its second season with a membership of fifty amateurs and two pro-

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*J. C. Millen, M.D.*
*Denver, Colo.*

*Dear Sir:*

*Your esteemed favor of the 28th ult. was duly received, and we regret that we have not been able to report to you before on our results with your Chromium Salt and Chromium Fixing Salt, having been extremely busy on account of alterations in our factory which have been going on while at the same time we were obliged to manufacture right along, not being able to stop until our arrangements could be completed. However, what you have sent us has been tested lately, and our Chemist reports that his results with these Salts have been highly satisfactory. He has tested same with our Opals and obtained very clear delicate whites. This is a severe test, and if this Fixing Salt is good for Opals it is certainly excellent for almost everything else as it simply means perfectly clear shadows without stain or any other defect. We wish you success with these articles, and are sure that they only need to be known to be appreciated. Hoping you will excuse the delay in our reply, owing to pressure in our regular work, we are*

*Yours truly,*

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fessionals, under the presidency of Mr. Hugh Rolston. During the year this club has done much good work for the encouragement of photography in Mobile, and its energetic secretary, Mr. Richard Hines, Jr., deserves a word of credit for his share in the success attained.

❧

Part II. of Todd's *Practical Reference Book of Photography* has been received and, after a careful reading, we may candidly state that it contains more practical information on negative-making, the dark-room, etc., than any other book of its size known to us. The contents of its 222 pages are arranged within 139 separate paragraphs thus:—*205, Chemical Terms Frequently Misunderstood; 228, Dissolving Chemicals; 229, Chemical Stains*, etc. Each paragraph deals with its subject in a practical, condensed manner, and the technical explanations essential to each subject are given in the simplest of language. Published by The Photo Beacon Co., Chicago and New York. Paper covers, 50 cents.

❧

*Flexoid* is the name of a new substitute for celluloid, likely to be exceedingly useful in photography. The new substance is said to be textureless, flexible, does not expand nor contract, will not buckle when wet, and dries without curling. It can be moulded, pressed, or turned; is free from gun-cotton, camphor, gelatine, or collodion, and cannot ignite spontaneously. Surely, in *Flexoid* we have a perfect base for sensitive emulsions, and, if all that is said about it be true, photographic manufacturers will welcome its advent as the beginning of a new era.

❧

The *Vademecum* is the title of a casket of seven Busch lenses recently introduced in the British market. This casket is supplied with two supplementary lenses, three optically worked light-filters for orthochromatic work, and the lenses have the standard flanges of the Royal Photographic Society. The set of seven lenses, giving 29 combinations, two correcting lenses and three light-filters, in a leather case, retails in England at $18. It would have a ready sale on this side of the Atlantic at double the price.

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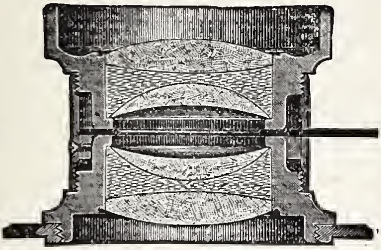

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"A quarter of a million cameras sold" is the proud boast of a recent advertisement of a British firm of camera manufacturers whose goods have appealed to the amateur since the writer of these lines was a youth. If the present "boom" keeps up, we will see more figures of this sort. It would be interesting to know, authoritatively, how many Kodaks have been sold since the first appearance of this instrument in 1888.

❧

*Conventions.*—The Nebraska Photographers' Association meets at Omaha, July 26th to July 28th, in connection with the exposition being held in that city; the Missouri Association holds its sixth annual convention at St. Louis, August 22d to August 24th; the Ohio Convention and Salon meets at Put-in-Bay, on Lake Erie, August 30th, 31st, and September 1st; Kansas falls in line in September; and Texas closes the convention year with a meeting at Dallas in October. The Iowa photographers held a successful meeting at Des Moines last month, and the photographers of Central Illinois are trying to effect an organization and convention.

❧

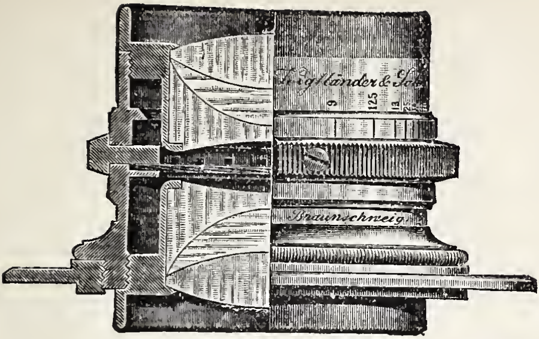
The *Union International de Photographie* meets at Hamburg, August 25th to August 31st, to discuss a very interesting programme. Americans travelling in Europe and desiring to participate in this event should communicate with Ernst Juhl, 41 Papenhuderstrasse, Hamburg.

❧

It is announced that *Photograms of 1899*, reproducing the best pictures of the year, will be double the size of previous volumes, and American work is to receive more attention than it has had previously. Those desiring to submit examples of recent work for reproduction in the volume should communicate with the *Editors of Photograms*, 6 Farringdon Avenue, London, E. C., as early as possible.

❧

The *Photo Club de Paris* announces the decision to abandon for the present year its usual international Salon because the Gallery des Champs-Elysêes is not available, and equally suitable rooms cannot be had.



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It is hoped to resume the holding of the exhibition in 1901.

◆

The convention of the Photographers' Association of America meets this month at Celoron, on Lake Chautauqua, and over a thousand professionals are expected to be present. This convention is the event of the year among professionals, and covers a whole week devoted to practical instruction under a skylight (provided by the American Aristotype Co.); business sessions at which topical questions pertaining to professional work are discussed, and an extensive exhibition of professional photography. F. W. Guerin of St. Louis is the president; S. L. Stein of Milwaukee is the vice-president; and George B. Sperry of Toledo is the secretary of the association. All the principal manufacturers of photographic specialties make fine displays of their wares at the convention, and the affair is one full of profit to the professional seeking a holiday combining pleasure and instruction. Those who can make it convenient to spend a few days at Celoron, between July 17th and 22d, will not regret either the time or expense of the trip. Special railroad rates have been secured, full particulars of which, with other information, may be had on application to Mr. George B. Sperry, 319 Summit Street, Toledo, O.

◆

The boom of prosperity which is supposed to be pre-eminently an American possession in this year of grace, appears to have struck Great Britain with equal force. The photographic trade over there is just kept hustling. Small firms are growing into large ones, and the large ones are incorporating. And there does not seem to be any undue inflation in it all. American firms are taking advantage of this happy state of affairs to place their goods on the English market; some establishing branch houses, others appointing agents. Since, years ago, the Eastman Co. so successfully showed the way, there has been a steady influx from this side. *Premo* cameras have been known there for five or six years, and some special lines, of which the most successful have perhaps been Higgins' *Photo-mounter* and the *Walkup Air Brush*, *Aerograph*, etc. Backgrounds have been shipped there almost since the beginning, and

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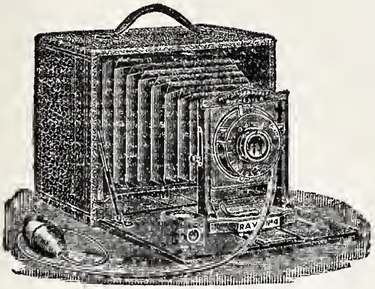

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many studios use such apparatus as *Semi-centennial Stands* or *Globe Enamellers*. But now the influx has become a rush. Almost every camera is going there—*Adlakes*, *Rays*, *Koronas*, *Montauks*, *Pocos*, *Monroes*, *Vives* and others are there; and a wonderful business energy was used to make *Velox* as well known as on this side. Bausch & Lomb *Diaphragm* and *Unicum* shutters are more and more used and *Self-toning Paper* is strongly pushed. The English manufacturers are happy in the face of it all, and everybody keeps busy.

* * *

We have received from J. C. Millen, M.D., one of the dollar sample packages of specialties which he advertised in our May issue. The package is certainly wonderful value, containing, as it does, goods of the value of nearly three dollars. As a mere matter of sensible packing, the various items are a pleasure to handle. The developers are put up in strong glass tubes, corked at each end and hermetically sealed with paraffin. The *French Satin, Jr.*, and the *Chromium Salts* are made up in sealed tin tubes. We have tried the *Acid Fixing Bath* during the past heated spell in New York, when tepid water dribbled from the tap and we were out of ice. It proved satisfactory with both plates and *Velox* and *Dekko* papers. The *French Satin, Jr.*, is a rapid-printing ferro-prussiate paper. From twelve negatives of varying densities (except that we hopelessly overprinted the first one) we obtained eleven good prints; the whites were white and there was no trace of muddiness in the half-tones. The prints, when dry, have a snap and brilliancy foreign to most blue-print paper, and justify the maker's claim that there is such a thing as "super-excellence."

Millen's *Standard White Paste* spreads as smoothly as soft butter. We tried it on several kinds of *Velox* paper—the terror of amateur paste-makers—and it sticks the prints to the mounts so tightly that we cannot separate them even at the corners. It is a strange fact that, while every civilized woman, and most civilized men, know how to make paste, there are not five firms in all Christendom who can make it right for the occasional user. Millen's paste appears to meet every requirement and will be in great demand as it becomes more widely known.

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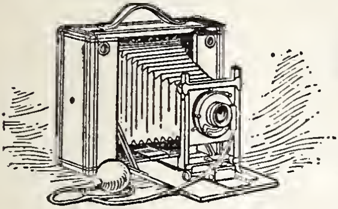

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It is something unusual for America to be "behind the times," but in the matter of illustrated postal cards we have been decidedly distanced, in the past, by Europe. For years souvenir cards have been enormously popular in Germany, Italy, Russia, and other countries, and they have generally been decorated with a colored lithograph of some celebrity or view. The removal by Congress of certain restrictions as to "private mailing cards" in the early half of last year led to the issue of enormous numbers of cards with patriotic illustrations, but their comparatively high price militated against their popularity. Now the Nepera Chemical Co. is issuing *Velox* postal cards, at a price actually less than the printed cards in the stationery stores. The sensitized surface is exposed and developed in the usual way, and a one-cent stamp does the rest. Such an obvious convenience will be welcomed by every amateur photographer. The same company now issues a *Double-weight Velox*, in "special rough" grade, which needs no mounting. We have used both the postals and the double-weight cards and find their manipulation as simple as the results are pleasing.

◆

*The Photogram* for June contains a short but interesting account of Camerapolis (Rochester, N. Y.). Even within the last twelve months, says the writer, the growth of the camera factories has been simply astounding. This issue of our contemporary is a trade number, and in addition to other special features, contains a twenty-four-page supplement, giving in alphabetical order some 1,500 trade names used in the photographic trade. The publishers propose to make this trade index an annual publication, and it will be worth the $3 which will be its price in future. Every dealer, and every amateur who takes an advanced interest in photography, should file a copy of the June *Photogram*. Its price is 15 cents and the American edition is published by F. J. Harrison & Co., 11 Howard Street, New York.

◆

The organizers of the *International Photographic Exposition*, to be held in Madison Square Garden, New York, next October, report gratifying progress. It is proposed to make the exhibition mark, in a special man-

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ner, the sixtieth anniversary of the announcement of Daguerre's discovery in 1839.

Among other features arranged for are exhibits showing the progress of photography in colors, lens-making, flash-light photography as employed in theatrical work, and a series of competitions embracing all branches of photographic work.

The project has been received with warm encouragement by photographic manufacturers here and in Europe, and the prospects for an affair of unusual interest are bright. The general manager of the exposition is Mr. Ernest R. Franks, whose address is 11 Howard Street, New York.

❧

Mr. John Carbutt, the manufacturer of *Eclipse Junior* plates, protests against our classification of this plate as *slow*—vide PHOTO-MINIATURE, page 126 (June number). Our opinion was based upon experience with a batch of plates of this brand shortly after their introduction. Mr. Carbutt submits a developed print from a negative made on an *Eclipse Junior*, exposure $\frac{1}{100}$th of a second, with bright sunlight, shortly before or after noon. From this it would appear that the plate may more correctly be classified as of medium rapidity rather than slow.

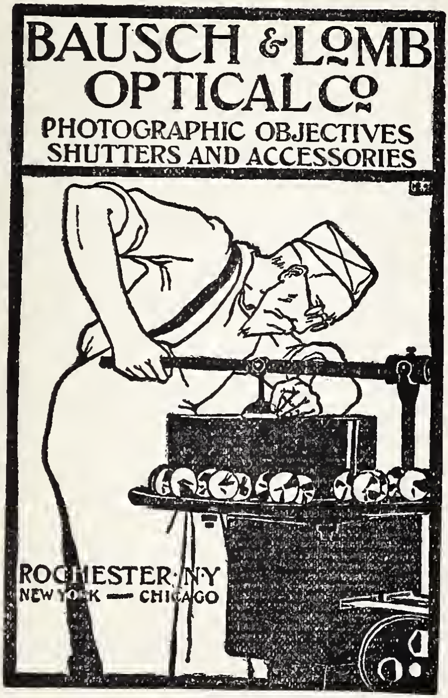
❧

*Camera Notes*, No. 1, Vol. III., the organ of the Camera Club of New York, contains a clever analysis of "American Portrait Photography," by Sadakichi Hartmann, and the number is superbly illustrated with photogravures and half-tones from negatives by Mrs. Gertrude Kasebier, R. L. Begue, A. Horsley Hinton, Clarence H. White, Breese and Eickmeyer, Bastien-Lepage, Whistler, Zaida Ben-Yusuf, G. C. Cox, and others. We congratulate Mr. Stieglitz upon the remarkable interest of this and previous numbers of *Camera Notes.*

❧

A camera club has been organized at Portland, Me., with the object of gathering together for co-operative work the many amateur photographers of the locality. The club will join the American Lantern Slide Exchange and will endeavor to offer an interesting series of exhibitions of prints and slides during the coming autumn and

ART CATALOGUE



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winter. The co-operation and assistance of other camera clubs will be welcomed. The officers for the year are: *President*, Geo. F. Gould; *Vice-President*, Newell W. Edson; *Treasurer*, J. Harry Lamson; and *Secretary*, Edgar R. Dow, to whom all communications should be addressed at 396 Congress Street.

❧

Messrs. B. French & Co., of Boston, American agents for the well-known *Euryscope Lenses* made by Voigtländer, have just issued a new catalogue of *Darlot lenses*, for which they are also sole American agents. This catalogue, while not as pretentious in its appearances as some other recent price lists, contains much useful information and tables valuable to all users of lenses. In its pages we note that Darlot has introduced a *Symmetrical Anastigmat* working at *f* 7.5. Copies of the catalogue will be gladly sent by Messrs. B. French & Co. on request.

❧

The following statement is clipped from an esteemed contemporary published not a hundred miles away from our office. It is calculated to excite the smiles of all who know the *insides* of photographic journalism in this country. A few figures would be much more convincing to those interested, and especially to advertisers. Let us have facts:

"We are gratified to record the fact of a recent still further increase in our edition. The sales of our magazine, when added to the number of copies required by our regular subscribers, has steadily grown, until, first, we found we had no sample copies left for gratuitous distribution, then that it was necessary to cut down the copies set aside for exchange purposes, advertisers, etc.; and finally, the subscriptions and sale of single copies continuing to increase, it became apparent that the only thing left them to do was to increase the size of our edition once more. This was accordingly done, with the result that this magazine now goes to a larger number of actual subscribers and purchasers than probably the entire paid circulation of all the other American photographic periodicals put together."

❧

"C. A. W." has read *Modern Lenses* (PHOTO-MINIATURE, No. 1) and asks, "Where can I obtain a thorough-

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❧

We have received the first number of *Photographic Life*, a new monthly published by the Photographic Life Pub. Co., Nepera Park, N. Y., at 10 cents a copy, or $1 per year. The object of *Photographic Life* is officially stated to be "to instruct and amuse all kinds and conditions of photographers," and, in keeping with this, a goodly proportion of space is given up to the humorous side of photography. Instructive papers are also given, by Dr. Leo Baekeland, Alfred Stieglitz, etc., and the make-up of the journal is very attractive. We welcome the new journal and trust it will fulfil its mission.

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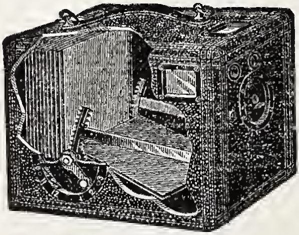

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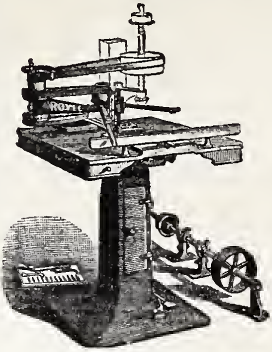

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*A Magazine of Photographic Information*

Edited by John A. Tennant

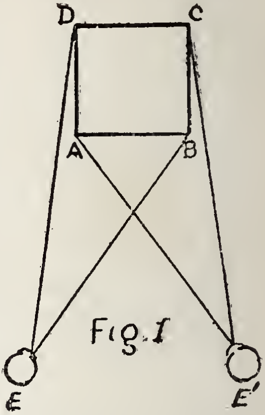
Vol. I AUGUST, 1899 No. 5

# STEREOSCOPIC PHOTOGRAPHY.

The stereoscope is an optical instrument by which specially prepared pictures can be viewed in such a way as to present an appearance of the third dimension, or solidity. The principle of stereoscopy is based on the fact that in looking at an object with the two eyes, each eye sees it from a slightly different point—the eyes being separated by a distance of about two and a half inches from centre to centre. It is owing to this fact of a slightly different image being formed by each eye that we are able to perceive the solidity of an object. Stereoscopy is considered a branch of photographic work, because it is only by photography that it is possible to prepare any pictures, beyond mere geometric designs, which give stereoscopic effect.

Two thousand years ago Euclid studied and wrote on binocular vision, or vision with two eyes. He demonstrated that each eye saw a different image in looking at an object ; and that it was by the union of these dissimilar pictures that the two eyes perceived the object as a whole. A little thought will show the truth of this. A person wearing spectacles will see only the left-hand glass and rim with the left eye, and the right rim with the right eye ; similarly the right-hand side only of the nose is seen with the right eye, and *vice versa.* Or hold this copy of the MINIATURE vertical and at right angles, close to the centre of the face. By closing one eye and looking at the book with the other, the front cover will be seen ; by closing this eye and opening the other, the Aristo eagle on the back cover will be seen. These rather extreme examples show that the two eyes form different images. In Fig. 1 the two eyes EE′ are looking at the cube A B C D. Both eyes see the side AB, but the eye E sees the side AD also, but does not see the side BC. The eye E′, on the contrary, sees BC, but does not see AD.

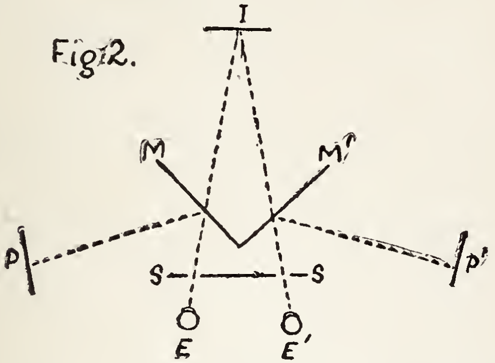
It might reasonably be supposed that if the two eyes see different images of a solid, the union of these images would give a blurred or indistinct picture of it, and many theories have been advanced to explain why this is not so. These theories are beyond the scope of this book; and we will refer only to one suggested by Aguilonius, who wrote on optics in 1603. He failed to demonstrate why the two dissimilar pictures blended into one sharp and distinct image; in fact his logic showed that in theory the image should appear confused. He suggested that it was due to a "common sense" exercised by the imaginative faculty that the images appeared sharp. This definition of "common sense," though not scientifically correct, is very useful in explaining stereoscopic vision, and will be referred to later.



**Wheatstone's Stereoscope.** It was not until sixty years ago, in 1838, that the stereoscope was invented. Prof. Wheatstone argued that if two plane pictures were made, representing the different views of an object as seen by the two eyes separately, and the two pictures were then superimposed, they should appear to the eyes to give the same relief as the object itself. To test this theory, he constructed an instrument which he named stereoscope (derived from the Greek words *stereos*, solid; *scopeo*, I view) and which is shown in Fig. 2.

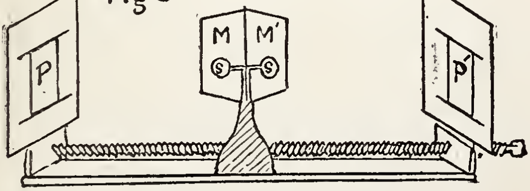
MM′ are two mirrors, mounted at a right angle. PP are the two pictures and they are mounted on a frame as shown in Fig. 3, by which their positions in respect to the mirrors can be adjusted by means of a right and left screw. The pictures are placed at the same horizontal height and are fixed in a groove to permit of their sliding backward or forward. By this means, the pictures can be adjusted so that their reflections from the mirrors pass through two openings in the screen, SS, where the eyes EE′ are placed, and these reflections coalesce or blend behind the mirrors at I.

Fig. 2.

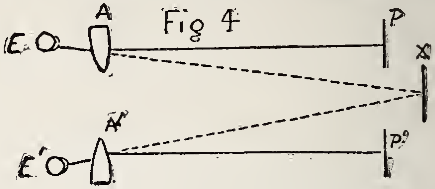


**Brewster's Stereoscope.** The announcement of Wheatstone's discovery greatly interested the scientific men of his day. An improvement in construction was suggested by Sir David Brewster, who used lenses instead of mirrors and combined the pictures by refraction instead of by reflection. Fig. 4 (not drawn to scale) shows the principle of Brewster's stereoscope. AA are two half lenses obtained by cutting a double convex lens in two. These two half lenses are placed with their thin outward edges together, and thus act as a concave lens—that is, rays of light passing

Fig 3



through them are bent outward. The two dissimilar pictures are placed at PP′ and the diverging rays are intercepted by the eyes EE′, and a combined image is



formed at X. Brewster cut a lens in two in order to insure equality in his two half lenses. Whole lenses may be used, but as the pictures are only viewed through the edge of the lenses, this is a needless waste. In the cheap stereoscopes which are made to-day a moulded lens of very inferior quality is used.

Further details of the stereoscope will be given toward the end of this monograph, after I have described the preparation of stereoscopic pictures and the apparatus required for their production.

Although the stereoscope was invented at the same time that Daguerre's discovery of photography was announced, no one seemed to think of producing stereoscopic pictures by photographic means, and for some seven years the stereoscope remained an interesting scientific toy, limited to the viewing of geometric diagrams; for it is beyond the art of man to produce duplicate pictures by means of brush or pencil of sufficient accuracy to meet the requirements of the stereoscope.

**Daguerreotype Stereograms.**

In 1845 Daguerreotypy was first applied to stereoscopy, but it was not until four years later that the trade felt sufficient confidence to commence the manufacture of stereoscopes on a commercial scale. Then, after British opticians had refused to make them, the French, led by Dubosq, took the instrument in hand, and true to their reputation, turned out some beautiful and serviceable instruments. At the same time they commenced the manufacture of stereoscopes they produced the pictures, both daguerreotype plates, and the paper positives of Fox-Talbot. Stereoscopy immediately became popular. With shrewd business instinct, the makers aimed at the "nobility and gentry" and their success was assured when at the London exhibition of 1851 a stereoscope with a set of slides was presented to the young Queen of England. The stereoscope became a popular craze, and stereograms, as the mounted prints are called, were much commoner, except for pure portraiture, than ordinary photographs; its popularity steadily increased for a dozen years, and reached its highest point in 1862. In that year at the international exhibition held in London, the stereoscope occupied a position that in more recent years the phonograph and the cinematograph have but feebly taken.

**Period of Popularity.**

Speaking of this wonderful popularity, William England, one of the ablest of stereoscopic workers, has said that at the exhibition of 1862, where photographs were the most popular kind of souvenir and where the sale of them ran into hundreds of thousands, "more than ninety-five per cent. of the views sold were for the stereoscope." He adds: "Of many of the popular subjects, I myself produced from ten to fifty stereoscopic negatives of each, which were always kept printing." And of two favorite pieces of statuary, he had more than a hundred negatives of each; and yet he was but one among many workers. I may conclude this section with an extract from a book by Robert Hunt, one of the ablest and best informed of the early writers on photography. It well illustrates the almost school-boy enthusiasm which, combined with sound, mature judgment, is so characteristic of the scientific writers of a half century ago. "The magic result of the resolution of two plain pictures into one, possessing to the eye the most positive solidity, is so striking when witnessed for the first time that it appears to be a deception of the senses. Even when fully accustomed to the phenomena of the stereoscope, there is so indescribable a charm in the beautiful pictures that they are gazed at again and again with increasing admiration. Living forms appear to stand out in all the roundness of life, and it is not possible to conceive a more perfect realization of the human form than that which stands forth prominently from the background of the stereoscopic picture. Statues, in like manner, are almost realized again in their miniature representations. Architectural piles are seen in all that exactness of proportion and gradation of distance, which is, in their minute reproductions, singularly interesting;

and in landscape the stereoscope gives us a re-formation of every image, in apparently the most perfect solidity and truth of distance. In the stereoscope we have at once an instrument which enables us to study many of the phenomena of vision, and to reproduce loved and beautiful objects, or interesting scenes, through the agency of those rays by which they were illuminated, in that strange perfection which, in its mimicry of visible external nature, almost baffles the examination of human sense."

**The Decline.** It is difficult to understand how stereoscopy, having once been so popular, could have so completely gone out. Many causes have been suggested, and the truth probably is that stereoscopic work while very simple and easy of understanding, requires care in each of the many operations connected with it, and this care has been too often withheld. This carelessness has been much fostered by the wonderful mobility of the eye, for the eyes will, almost unconsciously, strain themselves to rectify some error in the stereogram, just as they will strain themselves in trying to read fine print, or to see work in the twilight. In the succeeding pages, we will explain the right way in stereoscopy, and as we come to them one by one, will point out the errors to be guarded against.

**The Stereoscopic Angle.** We have said that the appearance of solidity is due to the slightly different viewpoint at which the object is seen by the two eyes. As the distance between the eyes is about two and a half inches, the pictures should in theory be taken from viewpoints separated to that extent. In practice, it is usual to fix the lenses three inches apart from centre to centre, or the same distance between identical parts of the lens-mounts. This refers to cameras fitted with two separate lenses for taking two pictures at the same moment of exposure. The reasons for mounting the lenses three inches apart are two: firstly, a desire to assist the appearance of relief by a slight exaggeration; secondly, to bring the axis of the lens nearer the centre of the sensitive plate. The smallest plate commonly used for stereoscopic work has a base line of fully six inches, and lenses separated by a distance of three inches will just be opposite the centres of the two halves of the plate.

It will readily be seen that the nearer an object is to the eyes the greater will be the angle of parallax—that is, the angle formed by the lines converging on an object from two separate viewpoints. In Fig. 5 the eyes are represented as E E′, and A B C D are different objects. It is seen that when the eyes are turned to A the angle formed by E A E′ is greater than the angle E B E′ formed by looking at B; and the farther away the object is the more acute, or small, is the angle. To bring the matter to simple figures, the angle formed by the eyes with an object a foot away would be 11.5°. With an object two feet away the angle would be about 5.5°, and this angle decreases very rapidly as the distance between the eyes and the object is increased. Thus at twelve feet away, the angle would be only one degree, and at a comparatively short distance, as landscape distances are reckoned, the axes of the eyes would be practically parallel.

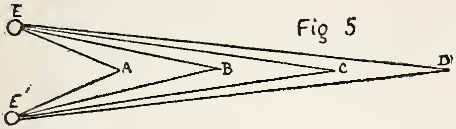
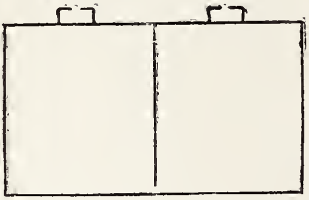


Fig 5

Fig 6


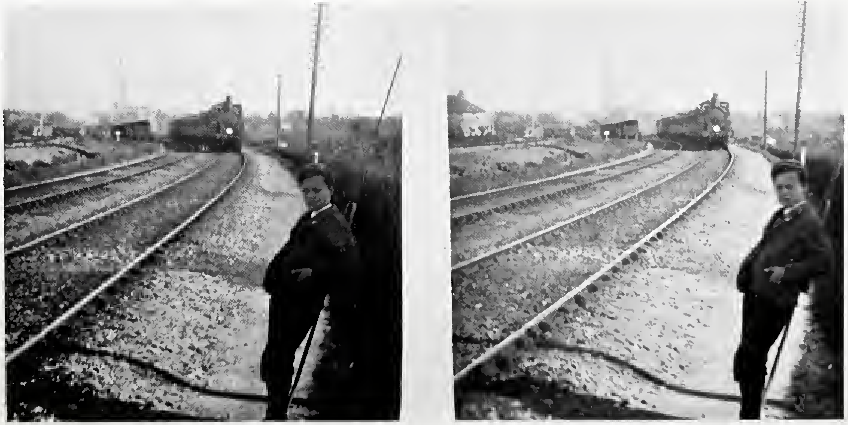
**Binocular Camera.**

Stereoscopic pictures may be taken with any camera. If a single-lens camera is used, two exposures are made on two separate plates and the camera is moved between the exposures. For many subjects, the single-lens camera and two exposures is better than a simultaneous exposure with two lenses; but for objects in motion a binocular camera is necessary. Fig. 6 shows this camera. It is simply a double box, but with the central division not quite reaching the back of the camera, so that one dark slide with a single sensitive plate in it will supply both; and with lenses accurately paired to the same focal length. Before the hand camera became so universal, photographers generally adapted their ordinary camera to stereoscopic work by fitting a front board to it with two lenses mounted side by side. A movable partition was placed in the centre of the camera reaching from between the lenses to the sensitive plate. This divided the camera into two equal chambers, preventing the light from either lens spreading beyond the centre line of the plate. In this age of taper bellows and other concessions to lightness of weight, the greater number of cameras cannot be adapted in this way. Most of the firms who make cameras make stereoscopic ones, among others being *Ascots, Premos, and Montauks;* and at least one firm has made a leading line of this class of camera in the *Vive*. The manipulation of a binocular camera, during exposure, is the same as that of an ordinary one.

**Dimensions.** The dimensions of the camera are subject to a very rigid rule. In preparing pictures for the stereoscope, it is necessary that the two pictures should be mounted with a distance of not more than two and three-quarter inches between the same points in them; and a distance of or very slightly exceeding two and one-half inches is better. There are special forms of stereoscope by which larger pictures can be seen, but there are very practical difficulties to prevent their general use. This limitation to two and three-quarter inches for each picture led to the use of a special size of plate with a base-line six and three-quarter inches and a height of three and one-quarter. This allowed a slight margin of width for trimming. The height is a matter of preference rather than rule, and many prints are now made four inches or more in height and are often improved by it, but the width must be rigidly adhered to. Perhaps the best size for a stereoscopic plate is 5 × 7 inches. This gives a width sufficient to allow a little selection in choosing the exact part of the picture to be used; and 5 × 7 is a very convenient and general size for ordinary photography. If the front of the camera is interchangeable so that a lens covering 5 × 7 can be substituted for the two lenses, we have a combined monocular and binocular camera covering a wide range of usefulness; 5 × 8 inches is a size approved by some workers, and it has the advantage that two plates of the common 4 × 5 size may be used side by side in the one holder. The expense of plates is a vital factor with many of us, and in-

THE BEGUM'S PALACE, BHOPAL

*By The Rajputana Stereoscopic Co., Ajmere, India*



OLD SARUM. By Theodore Brown

*Taken with the stereo-duplicon attachment in one exposure* stead of 4 × 5 plates, a camera taking two plates 3½ × 3½, or in England the universal "quarter" size of 4¼ × 3¼, may be used.

**Finders, Levels, Shutters.** An accurate finder is very necessary in stereoscopic work with rapid exposures. As the plate has a base-line of at least six inches and as the prints must be accurately trimmed on an absolutely horizontal base, it is equally necessary that a reliable level be attached to the camera. The shutters for stereoscopic work must give simultaneous exposure, and for the same length of time. Many of the shutters for ordinary cameras can be obtained for stereoscopy, and may be described as two shutters worked by a single release. Such shutters are manufactured by Bausch & Lomb (the Unicum), by Thornton-Pickard, Newman & Guardia, G. Gennert and others. A shutter may be used in which the gearing can be altered so that the two parts may be worked simultaneously or independently of each other. With such a shutter, single pictures may be taken on either half of the plate.

**Lenses.** It is necessary that the two lenses used in a stereoscopic camera be of absolutely the same focal length. All leading lens-makers supply lenses accurately paired for this purpose. Unless lenses are thus guaranteed, it often happens that there is a slight difference in the focal lengths of two lenses of the same make, especially in some of the lower-priced grades. In the case of single achromatic lenses, if the images formed on the ground-glass are not equally sharp, a washer of cardboard under one of the flanges to prevent its being quite screwed home in the front board will counteract the error; which is often due to inaccurate mechanical work in the lens-mount. In the case of a doublet lens, where the defect will be noticed by a slight difference in the size of the two images, slightly unscrew either the front or the back element of the lens giving the smaller image. A single turn of the thread may be sufficient. By increasing the distance between the front and back elements of a doublet lens, the focal length of the lens is increased and the image is thereby enlarged. Single achromatic lenses are generally preferred for all work except specialist lines, such as portraiture or architectural detail at a very short distance.

The slight distortion caused by a single lens is of no importance in outdoor land- or sea-scapes, and unless the lens is very short focus indeed even architectural interiors may be taken with a single lens, for the slight curving inward of the marginal lines in the picture is counteracted by the distortion produced by the eye-pieces of the stereoscope. Lenses of short focal length are usually employed for stereoscopic work. Many experienced workers use lenses of from three and one-half to five inches focal length. If I were limited to one pair of lenses, I would choose single achromatic of four and one-half inches, the exact length fixed on being a pure matter of personal choice. The reason for using such a lens is the small size of the picture required. A lens of four inches focal length will give in a picture with a base of two and one-half inches the same view as a twelve-inch lens would give on a seven and one-half-inch base. This limitation in width greatly curtails the field of view, and the longer the focal length of the lens, the less is the angle included, with a corresponding loss in the amount of relief-effect in the picture.

**Choice of Subject.**

In choosing a subject for a stereoscopic picture, it is very necessary to have a strong foreground, and some figures which stand detached from the rest of the scene help the effect. A rule might be given to have some prominent object not more than eight or ten yards from the camera. To understand this, it should be remembered that the appearance of solidity is due to seeing an object from two different viewpoints. But with objects at a distance, the lines reaching the eyes from them are practically parallel. We cannot perceive the solidity of a distant object by stereoscopic means. We judge distant scenes by perspective, by the different sizes of known objects—such as trees and houses—at varying distances; by the light and shade. The supplement illustration, " A Lane near Salisbury," is an admirable selection of a subject. The mass of bush on the left and the branches just entering the right-hand upper corner form a foreground to contrast with the distance, and through which the further objects will be seen as through a frame. The figure of the man will be the central object and will stand up clear and detached from the receding lane. The bush farther away on the bank will similarly stand out sharply distinct from the distant trees in the meadow and the stretch of land beyond. The bathing-scene on the Sipra River ghats is another good example, and it is an instance of the fact that a number of isolated objects—in this case the bathers—are more suited for stereoscopic reproduction than is a continuous subject, as the bank of a stream, unless broken as by bushes or rocks. The illustrations of "A Snowy Day on Fifth Avenue," in the June number of THE PHOTO-MINIATURE, are two subjects well adapted to stereoscopy. "Brooklyn Bridge," on the contrary, is better as a single picture. "Unloading the Catch," in the July issue, is another subject where the interest, strongly centred in the foreground, would ensure a very successful stereogram.

This necessity for some object to "stand out" has led stereoscopic workers to turn much attention to interior and architectural work. The "Begum's Palace," illustrated in this number, is a typical example of this work. Marble statuary has always been a favorite subject with workers, and there is nothing which better emphasizes the relief of stereoscopy. Still life, such as flowers, fruits, bric-a-brac, etc., are ideal subjects for the man who loves to experiment quietly at home; and they afford unlimited scope for personal taste.

Broadly speaking, there are few objects which may be rendered by photography to which stereoscopy cannot be adapted. It is now used very successfully in photomicrography; and by its aid, medical men hope to much increase the usefulness of the Roentgen rays.

**Angle of Convergence.**

Before describing the single-lens camera and the work for which it is preferable, we will briefly glance at a question on which strong and conflicting opinions have been held. Wheatstone advanced a theory that the angle at which the pictures were taken should equal the angle at which they were seen in the stereoscope. This law means that the angle made by lines drawn from the object focused to the lenses, should be about 18° or one-fifth of a right angle; if the picture is to be viewed in the stereoscope at the apparent distance of eight inches.

A more truthful law would be to invariably take the pictures with a lens separation of two and one-half inches; and to view them in the stereoscope with the same lenses with which they were taken.

Wheatstone's law has been mercilessly condemned;

and at first sight it appears absurd. On this basis, a picture at a distance of two feet from the camera should be taken with lenses seven and one-half inches apart, and a person seated ten feet away would be viewed with a separation of a full yard. Now, it is obvious that with our eyes separated a yard, we should see farther round a person's head than we do with our normal vision, and when the picture came to be placed in the stereoscope, it would show startling relief, but would not be true to nature. To take, say, a building two hundred yards away, the separation required would be sixty yards, and the result would be a stereoscopic view in which both ends of the house were visible in addition to the front. To call this a correct representation of the house would be obviously untrue. But there is the objection that there would be no relief in a picture of a house taken at a distance of two hundred yards with a lens separation of two and one-half inches only. The reply to this is that there would be the same relief in the stereogram as in the actual scene—that is none at all—and that the appearance of solidity would be suggested by the lighting, by the objects between the observer and the house, and in short, by our knowledge that it was a solid house in the "common sense" of our experience. The proper way to render this house would be to view it through or beyond a strong foreground, as of trees; and if several objects interposed at varying distances between the house and the camera, so much the better. There is, however, some truth in Wheatstone's theory. We should not see a representation of the house itself in the stereoscope, but we should see the illusion of a *small model* of the house, reduced to a scale of eight inches = 200 yards. This whole question may be taken from the ground of scientific accuracy and decided by personal taste. Distant objects may legitimately be represented in this way by one who understands the rules and who is careful to guard against exaggeration. In fact, it would be well to invariably work at an angle much smaller than the maximum one of 18°.

**Single-lens Camera.**

Any camera down to the cheapest of "fixed-focus" boxes may be used for stereoscopic work, and the only additional apparatus required is a tripod with a specially constructed stand affixed to the head. The camera cannot be held in the hands, as it would be impossible

APPROACH OF WINTER

*From the painting by L. E. Adan*

THE FOUNTAIN, CENTRAL PARK, NEW YORK

to keep it in the exact position required during the two exposures. After the picture is focused and a plate exposed, the camera must be moved three inches to one side and another plate exposed. The simplest way of doing this is by means of a stand constructed like a draughtsman's pair of parallels as shown in Fig. 7. This stand is screwed firmly onto the tripod-head by a screw at A. The camera is firmly fixed to the other parallel at B. After an exposure has been made, the parallel C D G H is moved to one side on the pivot arms X X and the camera is then in position at B′ for the second exposure. Another form of stand is Fig. 8. The screw holding the camera may be moved along the slot A B between the exposures. This form allows some discretion in the amount of separation and the camera may be slightly pivoted on its axis as described below. A disadvantage of this stand as usually constructed is that it is attached to the tripod at one end at the mark X in order to allow free play for the screw which holds the camera in place, and the head of which is under the board. This materially lessens the rigidity of the tripod.

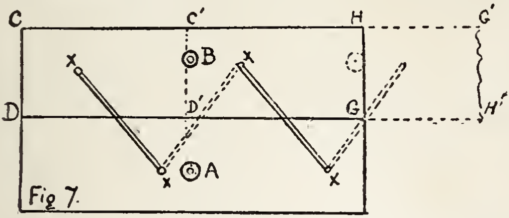


Fig 7.

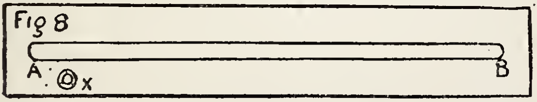
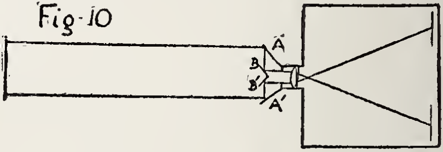


Fig 8

An older form of stand made was on an erroneous principle. It was argued that as the eyes converged in looking at an object, the camera should not be placed in parallel positions as done when using the stand described in Fig. 7, but that the axes of the lenses should converge as do the eyes. But we have shown that at a distance of twelve feet the angle formed between the eyes and the object looked at is very slight. It may be noticed, too, that in looking at even so small an object as a bunch of flowers, the eyes are not fixed on one point, but the glance passes over each flower, and as the bunch is of several inches diameter, it would be somewhat difficult to *converge* lenses onto it. It is therefore safe to ignore this old "dodge" in most stereoscopic work.

**Brown's Attachment.** Many attempts have been made to obtain both pictures with one exposure of a single-lens camera, and some of the suggested methods have been founded on a gross misunderstanding of the subject. A very ingenious and successful adaptation has been invented by Theodore Brown, of Salisbury, England, and its principle is shown in Fig. 10. Two mirrors marked AA′ are placed before the camera in such a way that each receives and reflects the scene into another mirror, from which it is reflected into the lens. So that instead of photographing the view the lens really photographs the scenes in the two mirrors BB′. As only one lens is used, the picture is inverted as a whole, and not each half independently, as is the case in double-lens cameras—as described in succeeding pages. There is therefore no need of transposition of the prints, and a print from the negative is ready for trimming and mounting.

Fig-10



**Distant Objects.** It may be wished to obtain stereograms of distant objects, without foreground, such as cliffs across a river. Here we must adopt the plan of two exposures on a base line of considerable length. We may move the camera twenty yards after exposing the first plate or it may be necessary to move it a hundred yards. Focus the object carefully and mark on the ground glass the exact position of some prominent object. After moving the camera to the second position, focus the prominent object onto the same spot on the ground glass and make the second exposure. This will not give a correct picture but a model of the scene. Instead of one camera, two with lenses of the same focal length may be used, and when both are accurately focused on the object, the two exposures are made simultaneously in response to a signal. It is in the latter manner that cloud stereograms are obtained.

Double-exposure work is sometimes rendered difficult by rapidly changing values of light ; on most days, however, the light is sufficiently constant. Trees in the very near foreground cannot be successfully taken when the branches are swaying in the wind.

**Portraiture.**

Portraiture and still-life studies are among the most successful branches of stereoscopic work. We would advise that the first attempt be made on this "at home" work. The manipulation is the same as in ordinary photography, and the single-lens camera is the better one to use. The camera may be moved between the exposures or the objects themselves may be slightly turned to give the different viewpoint. In the case of portraiture it may seem difficult to keep the subject still during the two exposures, but with details properly arranged, the whole operation should last a very few seconds. In professional studio work the lens may be mounted on a front board which slides horizontally, and the camera fitted with a partition down its centre, as already described. One picture is taken on one-half of the plate and the lens is then slid along the front of the camera for two and one-half inches, and the second exposure made.

The lenses used for portraiture are often three inches or more in diameter ; and when the flange of the mount is added to this, it will be seen that two of them cannot be mounted side by side and with their centres only two and one-half inches apart. Portrait lenses are worked at or near full aperture. But in stereoscopic work they require some stopping down. A single lens with an aperture of three inches is broader than the space between the eyes and would at one exposure see more than the eyes do. In diffused daylight the pupil of the eye is probably not more than one-eighth of an inch in diameter. It is not necessary that the lens be stopped down to this extent, but it should be worked at a small aperture. In portraiture, the eyes of the sitter require some little attention. In a full-face portrait the eyes often look direct into the lens of the camera. But the sitter would find it somewhat difficult to look into two lenses at once, and if one only is looked at, the effect in the stereoscope is curious and noticeable. In working with a binocular camera, therefore, a full face should be avoided. With a single lens the sitter may look into it during each exposure, being careful not to make any movement except this slight one of the eyes.

**Exposure; Development.** It is presumed that the person who practises stereoscopy has some knowledge of the ordinary photography, and as the general manipulation is the same in the two branches of work, a very few words will suffice under this head. It is very necessary that the exposure of the two plates be exactly the same; and this requires care where a single-lens camera is used. Under-exposure should be guarded against. We require a soft negative, full of detail; and this is obtained by a full exposure and development with eikonogen, rodinal, or some similar developer which gives softness. The two plates should always be developed together in the same dish. Plates of medium rapidity, rich in silver, are best suited where time exposures can be given; but any speed of plate may be used. As supplementing what has been said on exposure in previous numbers of THE PHOTO-MINIATURE, we give here a useful table for the use of which we are indebted to the compiler, H. L. Ide of Springfield, Ill. The table is calculated for June and the comparative exposures for other months may be calculated from the table which we here print.

*Dr. Scott's Table of Comparative Exposures.*

| Hour of Day. A.M. | P.M. | June | May July | April Aug. | Mar. Sept. | Feb. Oct. | Jan. Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|
| 12 | | 1 | 1 | 1¼ | 1½ | 2 | 3½ | 4 |
| 11 | 1 | 1 | 1 | 1¼ | 1½ | 2½ | 4 | 5 |
| 10 | 2 | 1 | 1 | 1¼ | 1¾ | 3 | 5 | 6 |
| 9 | 3 | 1 | 1¼ | 1½ | 2 | 4 | *12 | *16 |
| 8 | 4 | 1½ | 1½ | 2 | 3 | *10 | — | — |
| 7 | 5 | 2 | 2½ | 3 | *6 | — | — | — |
| 6 | 6 | 2½ | *3 | *6 | — | — | — | — |
| 5 | 7 | *5 | *6 | — | — | — | — | — |
| 4 | 8 | *12 | — | — | — | — | — | — |

* The accuracy of these figures would be affected by a yellow sunset.

# TABLE OF EXPOSURES.—By H. L. IDE.

| Hours Morning | | 5 | | | | |
|---|---|---|---|---|---|---|
| Hours Evening | | 7 | | | | |
| Remarks. | U. S. Stop No. | Sunshine. | Sun obscured. | Cloudy. | Very dull. | Gloomy. |
| Near view, with foliage or dark objects or shadows in foreground. Portraits and living objects out of doors. | 1 | 1/5 | 3/8 | 1/2 | 3/4 | 1 |
| | 2 | 3/8 | 3/4 | 1 | 1½ | 2 |
| | 4 | 3/4 | 1½ | 2 | 3 | 4 |
| | 8 | 1½ | 3 | 4 | 6 | 8 |
| | 16 | 3 | 6 | 8 | 12 | 16 |
| | 32 | 6 | 12 | 16 | 24 | 32 |
| | 64 | 12 | 24 | 32 | 48 | 64 |
| | 128 | 24 | 48 | 64 | 96 | 128 |
| Distant view no near foreground. | 2 | 1/10 | 1/5 | 1/4 | 3/8 | 1/2 |
| | 4 | 1/5 | 3/8 | 1/2 | 3/4 | 1 |
| | 8 | 3/8 | 3/4 | 1 | 1½ | 2 |
| | 16 | 3/4 | 1½ | 2 | 3 | 4 |
| | 32 | 1½ | 3 | 4 | 6 | 8 |
| | 64 | 3 | 6 | 8 | 12 | 16 |
| | 128 | 6 | 12 | 16 | 24 | 32 |

| Hours Morning | 6 | | | | |
|---|---|---|---|---|---|
| Hours Evening | 6 | | | | |
| U. S. Stop No. | Sunshine. | Sun obscured. | Cloudy. | Very dull. | Gloomy. |
| 1 | 1/20 | 1/10 | 1/8 | 1/5 | 1/4 |
| 2 | 1/10 | 1/5 | 1/4 | 3/8 | 1/2 |
| 4 | 1/5 | 3/8 | 1/2 | 3/4 | 1 |
| 8 | 3/8 | 3/4 | 1 | 1½ | 2 |
| 16 | 3/4 | 1½ | 2 | 3 | 4 |
| 32 | 1½ | 3 | 4 | 6 | 8 |
| 64 | 3 | 6 | 8 | 12 | 16 |
| 128 | 6 | 12 | 16 | 24 | 32 |
| 2 | 1/40 | 1/20 | 1/16 | 1/10 | 1/8 |
| 4 | 1/20 | 1/10 | 1/8 | 1/5 | 1/4 |
| 8 | 1/10 | 1/5 | 1/4 | 3/8 | 1/2 |
| 16 | 1/5 | 3/8 | 1/2 | 3/4 | 1 |
| 32 | 3/8 | 3/4 | 1 | 1½ | 2 |
| 64 | 3/4 | 1½ | 2 | 3 | 4 |
| 128 | 1½ | 3 | 4 | 6 | 8 |

| Hours Morning | 7 | | | | |
|---|---|---|---|---|---|
| Hours Evening | 5 | | | | |
| U. S. Stop No. | Sunshine. | Sun obscured. | Cloudy. | Very dull. | Gloomy. |
| 1 | 1/40 | 1/20 | 1/16 | 1/10 | 1/8 |
| 2 | 1/20 | 1/10 | 1/8 | 1/5 | 1/4 |
| 4 | 1/16 | 1/8 | 1/4 | 3/8 | 1/2 |
| 8 | 1/5 | 3/8 | 1/2 | 3/4 | 1 |
| 16 | 3/8 | 3/4 | 1 | 1½ | 2 |
| 32 | 3/4 | 1½ | 2 | 3 | 4 |
| 64 | 1½ | 3 | 4 | 6 | 8 |
| 128 | 3 | 6 | 8 | 12 | 16 |
| 2 | 1/80 | 1/40 | 1/32 | 1/20 | 1/16 |
| 4 | 1/40 | 1/20 | 1/16 | 1/10 | 1/8 |
| 8 | 1/20 | 1/10 | 1/8 | 1/5 | 1/4 |
| 16 | 1/10 | 1/5 | 1/4 | 3/8 | 1/2 |
| 32 | 1/5 | 3/8 | 1/2 | 3/4 | 1 |
| 64 | 3/8 | 3/4 | 1 | 1½ | 2 |
| 128 | 3/4 | 1½ | 2 | 3 | 4 |

| Hours Morning | 8 | | | | |
|---|---|---|---|---|---|
| Hours Evening | 4 | | | | |
| U. S. Stop No. | Sunshine. | Sun obscured. | Cloudy. | Very dull. | Gloomy. |
| 1 | 1/64 | 1/32 | 1/20 | 1/16 | 1/10 |
| 2 | 1/32 | 1/16 | 1/10 | 1/8 | 1/5 |
| 4 | 1/16 | 1/8 | 1/5 | 1/4 | 3/8 |
| 8 | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 |
| 16 | 1/4 | 1/2 | 3/4 | 1 | 1½ |
| 32 | 1/2 | 1 | 1½ | 2 | 3 |
| 64 | 1 | 2 | 3 | 4 | 6 |
| 128 | 2 | 4 | 6 | 8 | 12 |
| 2 | 1/128 | 1/72 | 1/40 | 1/32 | 1/20 |
| 4 | 1/64 | 1/32 | 1/20 | 1/16 | 1/10 |
| 8 | 1/32 | 1/16 | 1/10 | 1/8 | 1/5 |
| 16 | 1/16 | 1/8 | 1/5 | 1/4 | 3/8 |
| 32 | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 |
| 64 | 1/4 | 1/2 | 3/4 | 1 | 1½ |
| 128 | 1/2 | 1 | 1½ | 2 | 3 |

| Hours Morning | 9 | | | | |
|---|---|---|---|---|---|
| Hours Evening | 3 | | | | |
| U. S. Stop No. | Sunshine. | Sun obscured. | Cloudy. | Very dull. | Gloomy. |
| 1 | 1/72 | 1/36 | 1/24 | 1/18 | 1/12 |
| 2 | 1/36 | 1/18 | 1/12 | 1/9 | 1/6 |
| 4 | 1/18 | 1/9 | 1/6 | 2/9 | 1/3 |
| 8 | 1/9 | 2/9 | 1/3 | 4/9 | 3/5 |
| 16 | 2/9 | 4/9 | 3/5 | 7/8 | 1 1/5 |
| 32 | 4/9 | 7/8 | 1 1/5 | 1¾ | 2 3/8 |
| 64 | 7/8 | 1¾ | 2 3/8 | 3½ | 4¾ |
| 128 | 1¾ | 3½ | 4¾ | 7 | 9½ |
| 2 | 1/144 | 1/72 | 1/48 | 1/36 | 1/24 |
| 4 | 1/72 | 1/36 | 1/24 | 1/18 | 1/12 |
| 8 | 1/36 | 1/18 | 1/12 | 1/9 | 1/6 |
| 16 | 1/18 | 1/9 | 1/6 | 2/9 | 1/3 |
| 32 | 1/9 | 2/9 | 1/3 | 4/9 | 3/5 |
| 64 | 2/9 | 4/9 | 3/5 | 7/8 | 1 1/5 |
| 128 | 4/9 | 7/8 | 1 1/5 | 1¾ | 2 3/8 |

| Hours Morning | 10 | | 11 | | 12 | Noon | Month, |
|---|---|---|---|---|---|---|---|
| Hours Evening | 2 | | 1 | | 12 | Afternoon | June. |
| U. S. Stop No. | Sunshine. | Sun obscured. | Cloudy. | Very dull. | Gloomy. | U. S. Stop No. | Remarks. |
| 1 | 1/80 | 1/40 | 1/32 | 1/20 | 1/16 | 2 | Near view, light colored buildings or bright objects in foreground. Near view, with long distance street scenes. |
| 2 | 1/40 | 1/20 | 1/16 | 1/10 | 1/8 | 4 | |
| 4 | 1/20 | 1/10 | 1/8 | 1/5 | 1/4 | 8 | |
| 8 | 1/10 | 1/5 | 1/4 | 3/8 | 1/2 | 16 | |
| 16 | 1/5 | 3/8 | 1/2 | 3/4 | 1 | 32 | |
| 32 | 3/8 | 3/4 | 1 | 1½ | 2 | 64 | |
| 64 | 3/4 | 1½ | 2 | 3 | 4 | 128 | |
| 128 | 1½ | 3 | 4 | 6 | 8 | 256 | |
| 2 | 1/160 | 1/80 | 1/64 | 1/40 | 1/32 | 8 | Sea and sky. |
| 4 | 1/80 | 1/40 | 1/32 | 1/20 | 1/16 | 16 | |
| 8 | 1/40 | 1/20 | 1/16 | 1/10 | 1/8 | 32 | |
| 16 | 1/20 | 1/10 | 1/8 | 1/5 | 1/4 | 64 | |
| 32 | 1/10 | 1/5 | 1/4 | 3/8 | 1/2 | 128 | |
| 64 | 1/5 | 3/8 | 1/2 | 3/4 | 1 | 256 | |
| 128 | 3/8 | 3/4 | 1/2 | 1½ | 2 | | |

To use table, select class of subject in the large spaces to the right or left of table, then the U. S. Stop No. to be used, in the column adjoining. Reading across the table to the right or left, as the case may be, on the same line as the stop number, the proper exposure in seconds or fractions will be found at the intersection with the vertical columns, "Sunshine," "Cloudy," etc., under the hour of day shown at top of table.

**"Snowy" Appearance.** Except faulty mounting of prints, there is probably nothing which has caused the decline in the popularity of the stereoscope more than what is known as snowy appearance. Many stereograms which appear good photographs show, when viewed in the stereoscope, an appearance of grayness which dominates the whole picture. In extreme cases it is easy to imagine that the whole scene is veiled with a fall of snow of a very degraded color. The only thing comparable to it in ordinary photography is a rough bromide print underexposed, from a harsh negative, and badly developed. This effect would be fatal to stereoscopic success were it not that it can be very easily avoided. In an ordinary photograph a patch of white light is sometimes admissible or a number of reflecting surfaces, as of leaves or rippling water, may be tolerated. But, when in the stereoscope, the white light overpowers the whole picture. A plucky print which appears very pleasing to the eye may fail in the stereoscope, when a print soft, often to weakness, will give a good result. By giving full exposure and developing for softness, this difficulty will be largely overcome. If, however, hardness cannot be avoided, a supplementary exposure of the entire print to light after its removal from the printing-frame, sufficiently long to slightly tint the whites, will prevent the snowiness. A print may be lamentably flat and yet succeed as a stereogram; and detail which seemed hopelessly lost will stand out with distinctness and relief.

**Printing Paper.** The old-time albumen paper made a very satisfactory picture for stereoscopy; but the newer papers are equally good. *Aristo*, *Special Portrait Velox* or most of the glossy papers are very suitable. The necessity for soft prints has suggested the use of mat paper; but it should be remembered that in a stereoscope we view the pictures through magnifying lenses. Any grain in the paper if revealed in the stereoscope gives "snowy" appearance in its most pronounced form; and therefore, we find a glossy paper, with its minuteness of detail, to give the best results.

**Trimming; Transposing.**

The necessity of transposing stereoscopic prints when the negatives are on one piece of glass is not always clearly grasped, and may lead to some confusion. It is obvious that the picture seen with the right-hand lens of the camera should be seen with the right eye and *vice versa.* If not, the effect will be pseudoscopic, as described on a subsequent page. The reason for the need of transposing is very simple and easy to understand. It is due to the fact that a picture is taken "upside down" in a camera.

Fig 11.

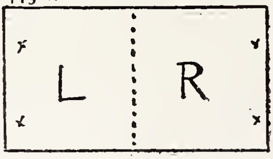


Fig 12.

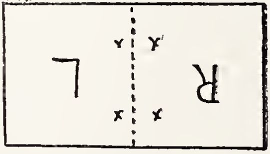
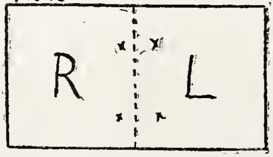
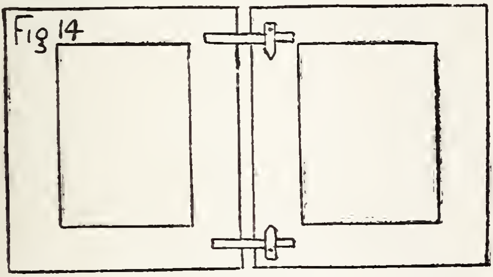


Fig 13.



Let L in Fig. 11 be the view as seen by the left-hand lens, and R the view seen by the right-hand lens; the marks XX show the outer edge of each picture. As the views fall on the sensitive plate, L is inverted on the left plate and R on the right plate, and the outer edges of the views are now side by side as in Fig. 12. Now if these negatives were on separate glasses, we could turn L right-side up and then turn R right-side up and yet let each one keep its relative position. But as they are fixed to one support they cannot be turned independently, and their positions when turned will be as in Fig 13. If it is desired to make a very large number of prints from a negative, the glass may be cut and trimmed to size with a diamond and the two halves placed in their correct positions, but for the greater number of workers this would be an unnecessary trouble; even if it were easy for an inexperienced hand to cut glass without injuring the film. The usual way, therefore, is to print from the reversed negative. When a print is obtained, mark on its back the one obtained from the R negative and which will be the left-hand print as they are joined together. Thus marked, there is no chance of getting the prints "mixed" after they are trimmed and before they are mounted. When two separate negatives are used side by side, or in a single-lens camera with double exposure, it is necessary that a mark be placed on the right-hand negative so that the two may not be misplaced; and the mark should be placed where it will show in the print before the print is trimmed.

To trim the print correctly requires *care.* There is no difficulty in the work, but carelessness must be avoided. It may here be pointed out that the difference of our vision is vertical only. That is, our eyes are placed horizontally, and though one sees further round an object, they each see the same amount of "top or bottom." If our camera has been kept perfectly level, the pictures will be in the same horizontal plane. If not, their bases must be trimmed to make them so. A very slight difference in this will quite ruin a picture. If the two prints are joined on one paper, select some prominent object in the foreground and lay a straight edge across the picture so that the object will be equally cut in each print. The bather in the Indian River scene is a good example. Run the cutting-knife along the length of the print. We now come to cutting the right-hand print, and here we face the important question of width. In the common form of stereoscope we cannot blend the two pictures into one illusion of solidity if they are mounted with a distance of more than three inches between the same objects in the two pictures. In fact, very few people can see prints mounted three inches apart except by straining the eyes, and two and a half inches is a better width. This limit of width has been much transgressed, and thousands of stereograms have been put on the market which have been useless except to discourage people in the practice of stereoscopy. Select the part of the print which is desired for the picture, lay the cutting shape or mask over it and cut out the picture. Here we come to a "dodge." It might be supposed that the sides of the pictures would be trimmed exactly alike, as was done with the base. But instead of this the left-hand print should have less of its left-hand margin and more of its right-hand margin than its companion print has. Turn to the illustration "The Begum's Palace." In the left-hand picture there is a chair in the lower left-hand corner. Notice how much less there is of this chair in this picture than there is in the companion picture. On the right-hand side of the left picture there is most included. This is especially noticeable in the receding pillars, and there are ten of them in this picture, while there are only six in the right-hand picture. Fig. 14 is a sketch of a double mask useful for trimming prints. It is in two parts and the guides allow of adjustment in width. The two halves of the picture are centred under the openings and are then cut out.



We termed the special trimming of the sides of the left-hand picture a "dodge," for its object is merely to assist the illusion of different planes of depth, by making the mount to appear as a frame *through* which the picture is seen. To understand this, stand at a window and look at the house across the street, or some other object. If you close the right eye and look with the left, you will see more of the right hand of the view and less of the left than if you look with the right eye. By trimming the views in accordance with this rule, we appear to gaze on a vista through an opening. If the prints were trimmed in the opposite manner the mount would recede from the picture, the view would appear as though mounted on a solid block, and the incongruity of seeing what should be an illusion of distance nearer than its mount would strongly tend to destroy any sense of correctness. It is not often that prints are trimmed so absolutely wrong but they are frequently trimmed identically, and are thus thrown into the same plane as the mount.

**Mounting.** There is a standard size of mount for stereoscopic work, three and one-half inches by seven inches, and as the holders of commercial stereoscopes are made to this width, it is well to use it, or at least to adopt the length of seven inches.

Be careful to mount the prints absolutely level and square and with a space rather less than three inches between similar points in their foregrounds. Mounting the pictures slightly apart, with about one-eighth of an inch of card showing between them, is often recommended. The object of this is to assist the illusion of a space between the mount and the receding picture.

**Stereoscopic Transparencies.** It was often said in the "old days" that photography attains its highest perfection and beauty in a good transparency; and the statement is not without a foundation of fact. A transparency well made, and properly placed in a suitable stereoscope, is certainly a very beautiful object. Transparencies may be made either by contact printing or in a copying camera, and while the latter method gives the better results, contact printing has the advantage that no special apparatus is required except a printing-frame. The frame as shown in Fig. 15 is somewhat different from the usual style. The dimensions given here are for a negative 5 × 7 inches, and as the measurements are few and simple they can be adapted to any size of plate. The frame is of the usual pattern, but the rebate to receive the plate is eleven and one-half inches long; whereas the opening to admit the light is but two and three-quarter inches and exactly in the centre. The frame may be five inches broad and the opening four and one-half to allow the rebate top and bottom. The negative is laid in the printing-frame with its right-hand picture over the opening. The breadth of the frame—five inches—prevents a vertical movement of the negative, but it may be moved horizontally to select the best part of the view. When the negative is in position note some object which is cut by the side of the opening; so that when the next half of the negative is printed from it it may be placed in exactly the same

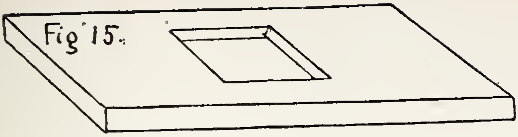


Fig 15.

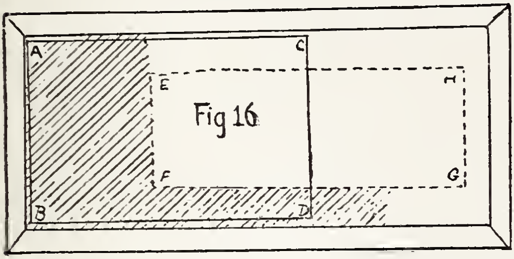
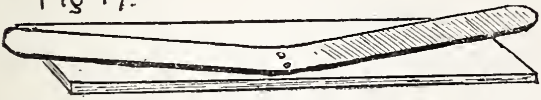
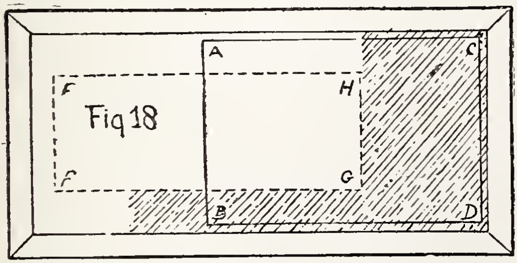


Fig 16

Fig 17.





Fiq 18

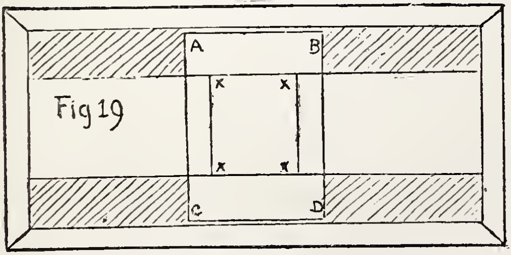


Fig 19

position. Place the sensitive plate on the negative with its left-hand half over the right-hand picture. By thus printing the right-hand negative on the left of the plate, and *vice versa*, we obtain the transposition of the pictures, the necessity for which we have explained. Fig. 16 shows the negative, indicated by the lines A B C D and the sensitive plate marked by the dotted lines E F G H. It is necessary that the exact *centre* of the sensitive plate should be over the right-hand side of the opening so that just half the plate is exposed. This is ensured by cutting a guide from stout cardboard. This guide and its position in the frame are shown by the diagonal lines in Figs. 16 and 18.

The size in which transparency plates are usually supplied is 3¼ × 6½ inches. If this size is used, the guide must be four and one-eighth inches long. The size of three and one-fourth allows some choice in the amount of foreground to be included—for our negative is five inches high. When the exact position has been chosen another guide of cardboard should be laid along the base of the plate. For ease of working it is usual to have these two guides in one piece, as shown in the diagonal lines, Figs. 16 and 18. The size four and three-eighths is constant, but the breadth of the card for the lower varies according to the amount of foreground to be included in the picture, and this necessitates having several guides to select from. The guide is pressed well home against the frame and the sensitive plate is pressed against the guide. The back of the frame is then placed in position and exposure is made to an artificial light. The frame is returned to the dark-room and the negative is moved until the left-hand picture now covers the opening. The card-board guide is then transposed and the right hand of the sensitive plate is placed over the negative. Fig. 18 shows the position now occupied by the negative, the sensitive plate, and the guide. Exposure is made to the same light as before. Daylight is too inconstant to make these double exposures by, and so some artificial light, such as an oil lamp or an incandescent light, must be used. It will be noticed that when the negative and sensitive plates are in position the negative will rest firmly in the frame, but one-half of the sensitive plate will overhang the negative and not be supported by the frame. If a heavy pressure were put on this the glass might break, and therefore the back of the frame is fitted with one spring only, as shown in Fig. 17, which places all the pressure exactly on the centre, where the two plates overlap. The frame should be lined throughout with soft black cloth.

In the case of a single-lens camera giving the negatives on two separate plates, a slightly modified form of frame may be used. Fig. 19 gives the dimensions of the one I use with my 4 × 5 negatives. In the frame the space A B C D is slightly sunk to receive the negative. The opening X X X X admits the light, and the bed for the plate is five and three-fourths inches long by four inches broad. This length allows a choice of the exact amount of foreground to be included by moving the negative vertically instead of moving the transparency-plate. This latter, therefore, I generally keep at a fixed position by means of the guide-cards indicated by diagonal shading. The right-hand negative is then placed in position and an exposure made. The left-hand negative is next put in the groove and the second exposure is made.

Several modifications of these printing-frames may suggest themselves to those who have already some experience in stereoscopy, but details of them would needlessly complicate the work of a beginner. Stereoscopic transparencies are usually masked similarly to lantern-slides, but the masks having two openings, as in Fig. 22.

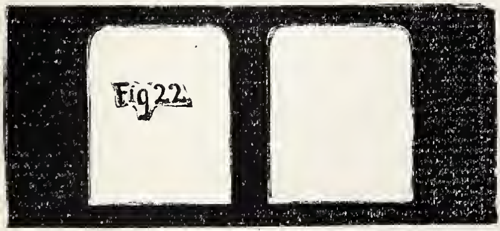


Fig 22.

**Camera Copying.** There is no doubt that, when feasible, transparency-making in a camera is the better way, and beyond an understanding of the special adaptations to stereoscopic requirements the process does not materially differ from other lines of work in the copying camera. Figs. 20 and 21 show an adaptation by which those who possess a stereoscopic camera with a movable front board may at a slight expense and without the purchase of a special copying camera copy their pictures. The lenses may be those used in taking the original negative but they should be mounted in a front board which admits of altering the distance between them. This can be done either by a left and right thread screw, or by strips of brass camera rack working on a cog-wheel. The negative is placed in the frame at AA and the sensitive plate at CC. The camera can be moved along its table toward or from the negative, and by means of the lateral adjustment of the lenses any portions of the negative can be brought to coincide on the sensitive plate, and if the camera is fitted with a rising front the amount of foreground can be regulated. If the photographer possesses a pair of short-focus double lenses, he can enlarge a portion of his negative if required; but in such a case a more elaborate holder, allowing of both vertical and lateral adjustment of the negative, will be required. In copying in a camera, the need of transposing the prints is done away with. We have explained that the transposition is due to the fact that each negative is at the time of exposure turned on its own axis, independently of the other negative. In copying in the camera a further turning takes place and the pictures are retransposed into their correct relative positions.

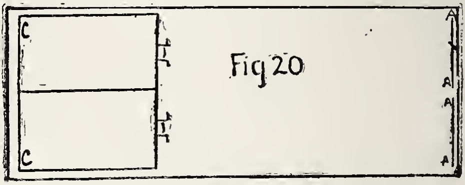


Fig 20

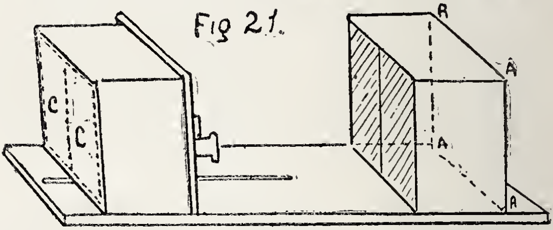


Fig 21.

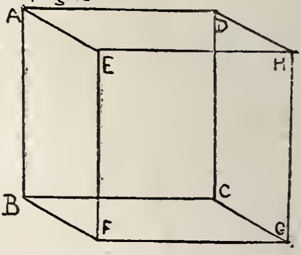
**Development and Tone.** Transparencies should be developed for softness and detail in the shadows. A fair amount of density should be obtained, but guard against the slightest opacity in the shadows. A good lantern-slide would be too thin and harsh for a good transparency. In toning the plates a warm brown tone is the one usually preferred.

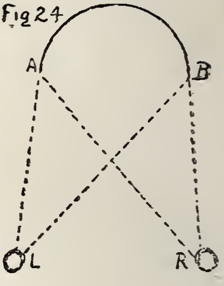
**Cover Glasses.** In a paper print the coated surface is of course the one which is exposed to sight—that is, the *back* of the print is pasted to the mount. It is obvious that in a glass print produced under similar conditions the coated surface must be similarly to the fore, and this is of importance owing to the liability of the film to injury. A thin cover glass of clear glass must, therefore, be used to protect the film. As transparencies must be viewed by transmitted light it is necessary, in order to secure softness and evenness, as also to prevent objects being seen through the transparent parts of the glass, that they be backed with a sheet of very finely ground glass. In transparencies with much delicate detail the grain of the ground glass shows unpleasantly under the magnifying power of the lenses of the stereoscope, and a fine matt varnish should be used. It will be seen that the finished work is composed of three separate glasses: first the cover glass, second the print, and lastly the ground glass, with a mask interposed between the cover glass and the print. These are bound together with a strip of gummed paper round the edges. The weight and clumsiness of three glasses may be got rid of when a transparency is made in the copying camera by turning the film side of the negative *away* from the lenses and copying the negative *through* its glass. If this is done, the transparency must also be viewed through its glass and the ground-glass backing will then also fulfil the part of cover glass.

**Pseudoscopy.** Pseudoscopy may be termed "negative stereoscopy," for by it relief is inverted into hollowness.

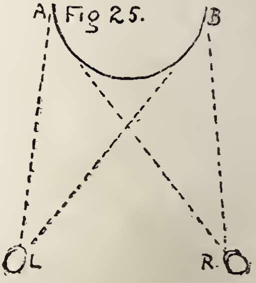
Sometimes when we look at a drawing of a geometrical figure, such as a rhomboid or a cube, we find that what appears to be the nearest side becomes the more distant one if the figure is gazed on steadily for a few moments. In Fig. 23, A B C D is the nearer face of a cube, but by gazing at the point E a few seconds the face E F G H appears the nearer one; and by continuing to gaze steadily at it the two faces will alternately come into the nearer position. As this figure is drawn, there is neither perspective nor shade to help the eye to distinguish the nearer side. If it were an actual cube made of bars of wire, we could not possibly mistake its nearer side, as the dissimilar appearance of the images formed by our two eyes would give the correct relief. But if the images formed by the two eyes could be in some way exchanged so that the left eye saw the picture from the position of the right eye, and *vice versa*, we should get a transposition of relief.

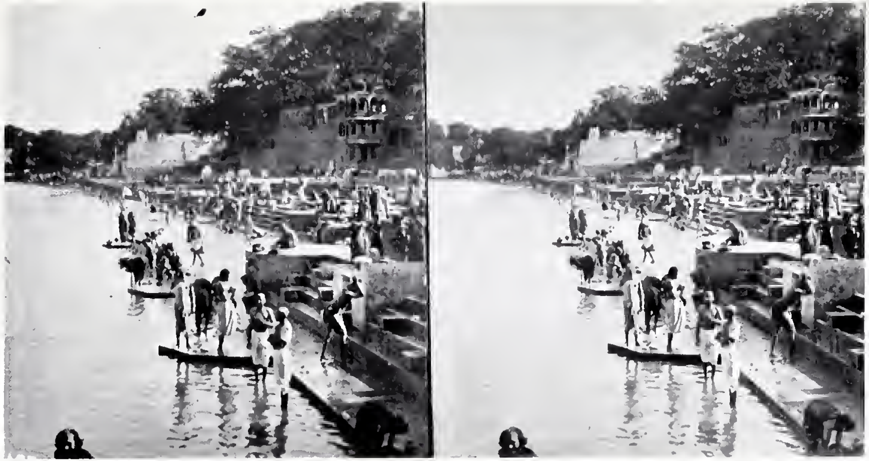
Fig 23





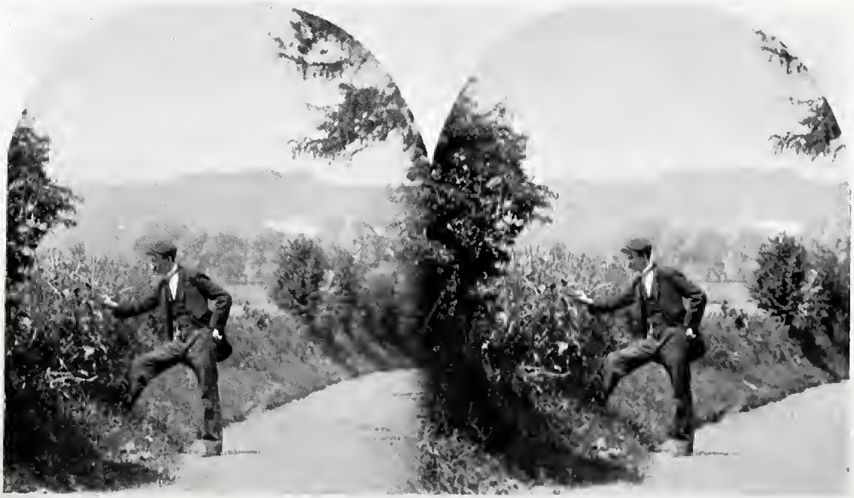
In Fig. 24 A B is supposed to represent a cup. The eye L obtains the bigger view of the right of the interior of the cup and the eye R sees most of the left side. But if the cup is turned so that the outside is toward the eyes, as in Fig. 25, L sees most of the left side and R sees most of the right. If a stereogram is made of this interior and the pictures are properly transposed in mounting, the illusion of the cup would be perfect. But suppose an error was made in mounting and the print showing most of the right side of the interior was placed in front of the right eye, then each eye seeing the proportions that it is used to seeing when looking at the outside of the cup, they would unite in giving the impression that the outside was actually seen. It will be





THE SIPRA RIVER GHATS, INDIA

*By The Rajputana Stereoscopic Co., Ajmere, India*

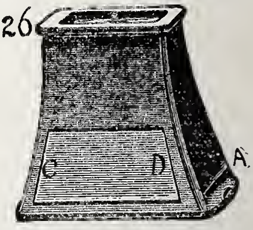


A LANE NEAR SALISBURY. Theodore Brown

*Taken with a single-lens camera, with double exposure* apparent from this that in all prints which are thus incorrectly mounted, convex objects will appear concave, and near objects will appear beyond the more distant ones. To follow this to its logical conclusion, the foreground in a picture should recede beyond the distance; and in portraiture the nose would sink into the face, the ears would appear nearer to us than the cheeks, and we would, in short, be looking into the mould of the face instead of on the face itself. But here comes in the factor of our experience, the "common sense" of Aguinolius. We *know* that the face is a face and not a mask, and our eyes refuse to accept the pseudoscopic effect. Proportionately as we are familiar with a subject we find it difficult to believe in an inversion of it. Dr. Chambers, who experimented in pseudoscopy, said that he found it easy to gaze steadily into a hollow mould of the face until the features rose toward him and appeared as a cast. With some practice, though not without difficulty, he found that he could gaze on a cast until it became as a mould. But he never acquired the faculty of seeing a real human face inverted. In this case, the eyes are so used to the proportions of a face that it was easy to imagine a mould as being a mask; but not easy to imagine the reverse. The practical application of this to stereoscopy is obvious. In prints mounted without transposition the effect is pseudoscopic. And this pseudoscopy is apparent in very erratic ways. It may happen that our "common sense," familiar with stereoscopy and assisted by the mobility of the eye, sees in correct relief an object which should be pseudoscopic. More often a compromise is effected. If there is any line marking the middle distance from the foreground, the latter will often recede and the distance advance. This is frequently seen in river views, where the foreground of river appears to be beyond the further bank, which hangs over the water as though it were a roof. If a number of isolated objects are depicted, the more distant ones will change places with the nearer ones. This strange intermingling much puzzles anyone who does not understand its cause. The most frequent result of faulty mounting, however, is a sort of compromise. The eye refuses to accept the inverted picture, but at the same time cannot obtain stereoscopic effect, and the result is dissatisfaction on the part of the person examining the pictures.

**The Stereoscope.** At the beginning of this monograph we referred briefly to the stereoscopes of Wheatstone and of Brewster. At the time of their popularity stereoscopes were as varied in their patterns as are the hand-cameras of to-day, but they were all variations of the "lenticular" form. Wheatstone's stereoscope was never a popular instrument, though from a scientific standpoint it is probably more correct than Brewster's. It can be used for pictures of any size, but one in which large pictures can be seen would be very large and cumbersome. Brewster's lenticular stereoscope, on the contrary, will not take a picture with a breadth more than two and three-quarter inches, but the pictures are enlarged by being viewed through the lenses. Distortion of the images and chromatic fringes—that is, fringes of color—on lateral objects have been urged as disadvantages connected with this form of stereoscope; but by employing achromatic eyepieces these difficulties are overcome. It must be borne in mind that the common form of stereoscope is sold for as low as twenty-five cents retail, and where the price is considerably higher than this, the added value is very often put into polish and finish rather than into the lenses. If cameras were made on such commercial lines, photography would not be the popular factor which it is to-day. Fig. 26 shows the most approved form of stereoscope in Brewster's day. Thirty-five years ago this "box" stereoscope, as it was called, was to be found in every home that boasted a "best room," though it is probably unknown to the younger generation. An American improvement, the invention of Oliver Wendell Holmes, completely supplanted the box. This, shown in Fig. 27, is the common stereoscope of to-day. In the old box-form, when at its best, the lenses were adjustable so that the distance between them could be varied, and also there were means of focusing. The picture was inserted in the back of the stereoscope through the slide at A, and was lighted by opening a door C D in the side of the instrument. The

Fig 26



Holmes stereoscope is the universal low-priced instrument of to-day. The two half-lenses are mounted in a frame and are covered by a hood. This hood is intended to shut out all light from the eyes except that coming through the lenses.

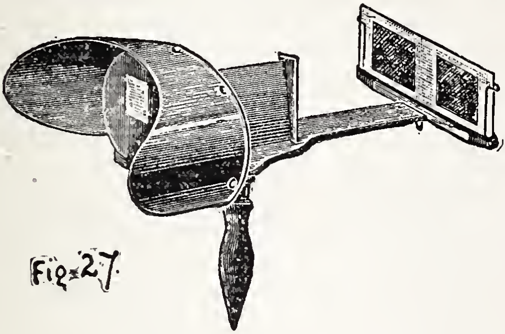


Fig. 27.

A rack for holding the stereogram slides upon a rod and can be pushed farther from or drawn nearer to the lenses, giving a focusing arrangement as effectual as simple. The vital defect of this pattern of stereoscope is that the lenses are usually fixed, and so will not allow of lateral adjustment to suit varying widths of eyes. This defect, however, is not inherent in this pattern but merely a convenience of cheap construction, and several adjustments may be used for automatically widening the lenses; such as a right and left thread screw similar to the one shown in the sketch of Wheatstone's stereoscope. A simple, home-made stereoscope may be made with two spectacle-glasses of eight inches focus, mounted with their centres rather more than three inches apart, so that the eyes look through the inner edges. With such a simple form, stereograms may be viewed when mounted in an album.

A simple and very useful little stereoscope is the invention of Theodore Brown, whose camera attachment we have already described. This is no larger than a watchmaker's eyeglass, with two reflecting mirrors instead of a lens. Fig. 28 shows it, and Fig. 29 the plan of its working. It is held closely over the right eye at such an angle that the right-hand picture B falls on the mirror C, is reflected to the mirror D, and from thence to the right eye E. The mirrors are placed at such an angle that the picture B is seen by the right eye in the same apparent position that the left-hand picture is seen by the left eye. The left eye looks directly at the left picture, and the stereoscope by its double reflection at a carefully adjusted angle superimposes the right-hand picture onto the left one and so secures the stereoscopic effect. With such an instrument pictures can, of course, be viewed when pasted in a book or lying on the table, or they may be held in the hand in any position.

Fig 28

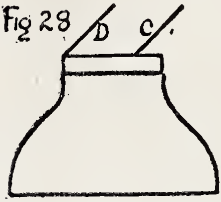
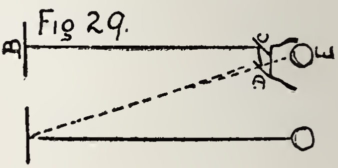


Fig 29.



For viewing transparencies the Holmes stereoscope is not suitable, and we must use a modified form of the box stereoscope, with its bottom fixed with a sheet of ground glass, and see the picture by transmitted light. In this case the box stereoscope may be mounted on a light stand on the table, fixed on a pivot so that the ground glass may be turned to the strongest source of light, or a mirror reflector may be used. This form of box stereoscope is used in museums and for slot-machines. For this purpose the box is enlarged to make room for a number of transparencies which are fastened to an endless chain passing over a roller which is turned by a handle, bringing the pictures in turn before the lenses. In this form of stereoscope the illumination of the pictures is usually obtained by reflecting some brilliant artificial light through them.

**Grubb's Stereoscope.** Most of the objections urged against Brewster's stereoscope may be legitimately met and overcome. But the fact of size, not more than two and three-quarter inches broad, is absolute, and this practically confines us to a square form of picture. This was not a defect, perhaps, in the old days of photography, but nowadays we like to select our pictures without regard to size of plate or mount, and should be able to view either a narrow upright panel or a long low panorama. This can be done by the use of a Wheatstone stereoscope, but the prismatic stereoscope of Sir Howard Grubb is a better instrument. Its invention was due to a desire to overcome the difficulty which some people experience in keeping the two pictures in register. Our eyes are so used to altering the convergence of their axes, by glancing at objects at varying distances away—as when we look round a room, or at the people in a car—that some persons cannot control their eyes when looking into the stereoscope, and the pictures seem to swim alternately into and out of register. It occurred to Sir Howard Grubb that if the pictures were displaced vertically instead of horizontally, this difficulty would be overcome, and the outcome of his experiments was Fig. 30. The two pictures, A B, are placed exactly over one another. Instead of lenses, two right-angle prisms are used—or mirrors may be used instead. One, which is drawn with solid lines, reflects one of the pictures into the eye, and the other, drawn with dotted lines, is adjusted at a slight angle to reflect the other picture. In overcoming the difficulty of horizontal adjustment Sir Howard Grubb made a stereoscope which will take any size or shape of picture.

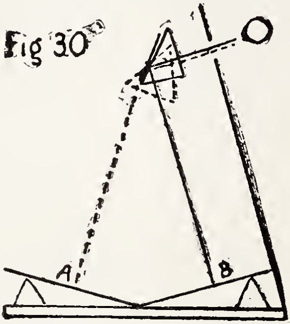


Fig 30

With this stereoscope, as with all single-reflecting instruments, the picture will appear reversed, as to right and left. It is necessary, therefore, to produce reversed prints by the carbon or some similar method; or by using a celluloid negative and printing through it. In portraiture this is not essential. We are so used to seeing reversed images of ourselves or friends in a mirror that we do not notice the reversion, but in anything with which we are not so familiar—as a clock, or printing in its reversed form — the alteration is very apparent.

**Stereoscopic Vision.** It is possible to see the true stereoscopic effect in binocular pictures without the aid of a stereoscope. The stereoscope merely assists the eyes to join the two pictures, and if the eyes can do this without such aid, the stereoscopic effect is still obtained. This ability to see pictures in relief is attained by training the eyes to look at the picture with their axes parallel—that is, as though they were looking at some distant object. A very little practice is necessary to attain this, and once got, the faculty is not lost. On the margin of a sheet of paper or card make two marks about an inch and a quarter apart, thus :—

● ●

Hold the card with the dotted margin uppermost and facing the eyes, about a foot in front of the face. Look steadily just over the edge of the card at some object about twenty feet away and then raise the card so that it intercepts the vision, but keep the eyes steadily focused at the twenty-foot distance. Instead of two dots there will appear four dots, and the two central ones will approach until they coalesce. There will then appear to be three dots, and the eyes will be fixed on the central one. When this can be easily accomplished, repeat the experience with two dots rather farther apart, and gradually increase the width of the dots until two dots which are two and a half inches, or a little more, apart can be united. If for the dots we now substitute a stereogram, we shall obtain true stereoscopic coalescence.

● ●

**Stereoscopic Projection.** It has long been the desire of inventors to obtain a thoroughly satisfactory stereoscopic effect with the stereopticon. To be able to project on a large screen pictures in relief, that may be seen by a roomful of people at once, would mean money to the successful man. It has been accomplished in several ways, but each person seeing the pictures must be provided with a specially constructed instrument to enable them to see the effect. The two dissimilar pictures have been thrown onto the screen through colored glasses and when looked at through other colored glasses, each eye received one picture only.

In one of the most successful modifications of this the light passing through the two pictures was polarized. The pictures were superimposed on the screen, representing a mere blurr to the eye, but when examined through special spectacles (polarizers), each eye saw only its own picture, and true stereoscopic effect was obtained.

One of the oldest attempts at stereoscopic projection was based on what is known as persistence of vision. That is to say, the eye retains the impression of a thing for a fraction of a second longer than it really sees it. In this attempt the two halves of the transparency were placed in separate lanterns, and were projected onto the same place on the screen. A revolving disk was arranged in front of the lanterns so that when it turned it cut off the pictures alternately from the screen. This disk could be rotated at any desired speed, and it worked in conjunction with a second disk which rotated before the eyes of the watcher. At the moment the right-hand picture appeared on the screen the right eye saw it, and the left eye was blocked by the opaque part of the disk. When the right-hand picture was replaced by the left, the right eye was blocked and the left saw the picture. This instrument worked satisfactorily, but the delicate mechanism, and the necessity of having a similar disk correctly gauged for each watcher, prevented its practical adaptation. Curious as it may seem, stereoscopic projection will probably be first reached through the more intricate cinematograph ; and we shall see moving pictures in the third dimension before we attain the same result with the older lanterns. There are many interesting bypaths to stereoscopy, and most of them are all unexplored. One only we will mention.

**Coloring Stereograms.**

To color prints in such a way as to suggest a nearer approach to reality is difficult. But for the worker who takes up stereoscopic work as a labor of love there is an almost unworked field here which offers interesting possibilities. Color applied to a landscape should be touched in with microscopic precision, for the slightest spreading or overlapping will be unpleasantly noticeable in the stereoscope. Such work, too, tends to upset the relative tones and planes in the picture, and in relief is so difficult that it cannot be advocated. But in the treatment of some still-life studies, such as flowers, crystals, shells, or other natural-history subjects, it is possible to obtain results which are pleasing if not of scientific value. Transparent (analine) colors are the best for this class of work, and they should be very much thinned down, so as to merely stain the part to which they are applied without leaving any unevenness of brush-mark or pigment. Very interesting results in coloring may be obtained by working on one only of the pictures. The coalescence of the tinted and untinted pictures in the stereoscope, or of two pictures colored in different tints, often gives a shimmering iridescent color in the result unlike either of the original colors.

**The Stereoscopic Revival.** Will the stereoscope ever attain to its former popularity? For years a band of the older workers have said that it was coming, and "the stereoscopic revival" has become almost a proverb. Of late they have been more prone to speak of "this now once more popular fashion." But among the present generation of workers practical stereoscopic work is little known, at least in America. In France, where the stereoscope has never quite lost its position, binocular cameras are now listed in dealers' catalogues almost as prominently as the more universal single-lens camera. In England, thanks to the persistent advocacy of a few men, stereoscopy is an important branch of work. In America alone, where much of the best and most useful work has been done, the stereoscope has fallen somewhat behind. Yet America may almost be said to supply the world with stereoscopes, and her aggregate trade in stereograms, both domestic and foreign, is very large. One of the causes making against this revival has been the want of a simple hand-book on stereoscopy. That want this MINIATURE will, we hope, fill. Stereoscopy was in the past ruined by the carelessness or ignorance of a few wholesale workers, at a time when there were comparatively few photographers in the land. It remained in oblivion for years, during which the hand-camera was introduced, leading to an enormous number of new workers who have now passed the initial stages of photography and may be classed as competent workers. To them stereoscopy is a fascinating field, and it is not a difficult one. Stereoscopy spells care, but every worker who has developed his first score of successful negatives and made his first score of satisfactory prints is able to exercise the little care required. The dealer, who "does the rest," can handle stereoscopy as ably as any other branch of the work. It is these workers, some professionals, many amateurs, who will take in hand the reviving of the most alluring of photographic pursuits; and once their attention is directed to the subject, stereoscopy will widen into new adaptations and wider possibilities until it is to the stereoscopy of the past as is all photography to-day to the work of forty years ago.

## BOOKS.

The literature of stereoscopy, though voluminous, is comparatively inaccessible. From the time when Wheatstone read his first paper down to the present day, the more valuable contributions to this subject have always appeared in the journals of scientific societies or in the photographic magazines. Sir David Brewster's book, *The Stereoscope*, has long been out of print and scarce. The modern literature on the subject comes largely from France, and I mention two of the best of these books, which are obtainable from Gauthier-Villars, Masson & Co., Paris, France.

Three English elementary handbooks have been published, also listed below. The late J. Traill Taylor contributed a series of short practical chapters to the *British Journal Almanac* of 1887, and supplemented them by a further series in the same Annual for 1895.

*Traité de Photographie Stéréoscopique.* By A. L. Donnadieu. 1892. With 20 plates. 9 francs.

*La Photographie Stéréoscopique.* By R. Colson. 1899. 1 franc.

*The Stereoscopic Manual.* By W. I. Chadwick. (English.) 1891. Illustrated. 50 cents.

*The Stereoscope and Stereoscopic Photography.* From the French of F. Drouin. 1897. Illustrated. Cloth. $1.00.

*The Elements of Stereoscopic Photography.* By C. F. Seymour Rothwell. 1896. 25 cents.

# NOTES

Thanks to the appreciation of its friends in all the four corners of the world, the circulation of THE PHOTO-MINIATURE continues to show encouraging growth. The second edition (2,000 copies) of No. 1—*Modern Lenses*—is being rapidly taken up by new readers, and we are reprinting No. 2—*The Pose in Portraiture*—(2,000 copies), the first edition being exhausted. These things we mention, not in self-praise, but to share with our readers the pleasure we have in the success of the magazine, in which they have shown so much kindly interest.

We apologize for the abominable paper used in this and the July number of THE PHOTO-MINIATURE. It resulted from confidence misplaced, and was discovered too late to be remedied. Special paper is now being made to our order, and future issues of the magazine will be easier to read, as well as more attractive to the eye.

❧

Photographically, July was an interesting month. It included the American and British conventions; the appearance of several new books of more than usual interest and a new photographic journal printed in four languages; the announcement of a studio to be opened in Chicago, where portraits "in natural colors" are to be made, and a rumor that we are soon to have an American anastigmat which will out-focus foreign competitors and work at *f*/4.

❧

The American National Convention, which met at Celoron, on Lake Chautauqua, N. Y., July 17th to 22d, under the able leadership of Fitz Guerin of St. Louis, was a practical and enjoyable affair from start to finish. It is, of course, impossible to chronicle here a tithe of the things seen and heard at the convention. They are all to be seen in the official report printed in the August professional journals such as *Wilson's Photographic Magazine*, the *Bulletin*, etc. But we cannot forbear the recital of a few of the convention's features, in the hope of inducing our readers to participate in the next meeting, which is to be held at Milwaukee in 1900.

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The event included an exhibition of the best work of the year (professional); representative exhibits by the principal manufacturers and dealers in photographic supplies; a series of meetings devoted to the discussion of topics belonging to the profession; a school of practical photography, conducted by the American Aristotype Co., wherein such portraitists as Pirie MacDonald, "Billy" Rundle, and John S. Schneider demonstrated their studio methods; and the usual entertainment features, such as a night at the opera, a ball, New England clambake, etc. Disposing of the latter first: the clambake, under the skilful management of Col. Geo. B. Ayres, of Chicago, was an achievement of which Col. Ayres may justly be proud to the end of his days; the ball, given by the citizens of Jamestown, was voted "simply delightful" by all who attended it; and the opera was a musical treat which surprised everybody. The centre of interest, however, was the exhibition, and in the aggregate the collection there assembled was one of which American photographers may well be proud. The work comprised portraiture (from the dainty carbon miniature on porcelain to the life-size portrait on rough etching paper); interior, landscape, and commercial photography; flash-light and *genre*. The grand prize of the Association was carried away, for the third time, by Pirie MacDonald, of Albany, N. Y., and despite the splendid work on every side, the award was fairly won. It would be difficult to describe the charm of MacDonald's work, which seems to reach and comprehend all that is desirable in portraiture. In his miniatures, and equally in the larger portraits, he seems to perfectly express the characteristics of his subjects, here dignity, there grace, the virility of the man, the tender charm of woman; in this we are held by the subtlety of interpretation, in that we see only the most exquisite simplicity. The grand secret lies in his mastery of characterization: he seizes what is essential, interpreting the passages with remarkable breadth and suppressing whatever is superfluous. To say this is not to say that Mr. MacDonald's work was without fault. There were obvious defects here and there, but the average was incontestably higher than that attained by any other exhibitor. Among isolated exhibits worthy of the highest praise, we may mention the picture of a mother and child by Knaffl Bros., of Knoxville; the

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picture of an old man entitled "The Evening of Life," by Mr. Geo. H. Van Norman, of Springfield, Mass., and the miniatures sent by James Arthur, of Detroit, with one or two included in the collection of Louis F. Jansen, of Buffalo. Of other interesting exhibits our space does not permit of mention, except the picture of "Orina" in the set sent by W. N. Brenner, of Cincinnati, which seemed to us to surpass anything previously shown by this photographer. It was a portrait, 11 × 14, printed in a warm brown carbon, of a young girl, cleverly and sympathetically handled, and full of delicacy in illumination and modelling. Geo. C. Lawrence, of Chicago, sent an exhibit of flash-light work of large size, including such subjects as the Michigan Senate in session (28 × 36 inches). These were printed direct from the untouched negatives, without dodging, and considering the immense difficulties overcome in their production, may fairly be said to represent the highest achievement in this special line of work. The landscape work exhibited, when compared with that seen at amateur exhibitions of the better class, was not of a very high order, but the displays made by L. V. Kupper and Geo. E. Tingley deserve a word of praise as showing sentiment and an appreciation of pictorial effect. The work in *genre* and in interior photography exhibited was, with a few exceptions, feeble in composition and poor in quality.

The most prominent speakers at the business sessions were Lorado Taft, of the Chicago Art Institute; Professor Griffith, of the Detroit Museum of Art; George G. Rockwood, Pirie MacDonald, John S. Schneider, and A. L. Bowersox. Mr. Taft's talks on "The Art Side" were received with wild enthusiasm; Mr. Rockwood was as earnest and as helpful as ever; Mr. MacDonald made two "soul-stirring appeals," the one for recognition of the State Associations, the other for Milwaukee as an ideal location for the 1900 convention; and Messrs. Schneider and Bowersox offered many pertinent pointers on professional practice. The meetings were well attended and interesting. S. L. Stein, of Milwaukee, was elected President of the Association for the ensuing year; George B. Sperry, of Toledo, First Vice-President; George E. Edmondson, of Cleveland, Second Vice-President; F. R. Barrows, of Indiana, Treasurer; and George Nussbaumer, of Buffalo, Secretary—a thoroughly good selection.

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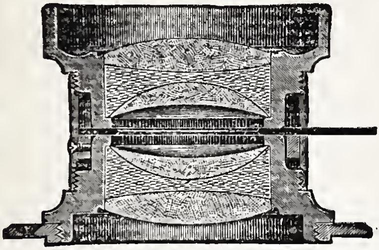

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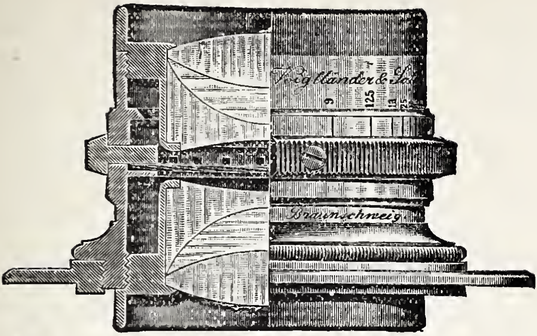
Messrs. E. & H. T. Anthony & Co. had on exhibition a choice selection of their cameras and other novelties ; the Lovell Dry Plate Mfg. Co. was represented by Mr. C. O. Lovell and Mr. John Pringle, occupying a tastefully furnished alcove ; the A. M. Collins Mfg. Co. showed an effective array of novelties in card-mounts, some of which we describe elsewhere. This exhibit, managed by Messrs. Mendenhall and Hood, attracted many visitors. The Hammer Dry Plate Co., the M. A. Seed Dry Plate Co., and the G. Cramer Dry Plate Co. all had neatly arranged retiring rooms for their visitors, and Messrs. Hammer, Sr., L. F. Hammer, Jr., Mr. Weaver, Mr. George Murphy and Mr. Bridges, Mr. G. Cramer and Mr. J. C. Somerville were " here, there, and everywhere," happily occupied with their callers. Mr. W. P. Buchanan, of Philadelphia, had an interesting exhibit of backgrounds, *Luxo* and *Luxo Flash-lamps*, etc.; Rough & Caldwell, and L. W. Seavey, of New York, made special displays of grounds and accessories ; and the Haller-Kemper Co., of Chicago, represented by Mr. Pfabe, showed their many specialties, such as *Kruxo*, *Sensitol*, *Tolidol*, etc., with a collection of prints demonstrating what could be done by their aid. The Gundlach Optical Co., of Rochester, was represented by Mr. H. H. Turner ; C. P. Goerz, of New York, represented by Mr. L. J. R. Holst, showed a few notable, large-size instantaneous photographs made with the *Goerz Anastigmat ;* the Reflex Camera Co., represented by Mr. Wheaton, exhibited the new *Reflex* single-lens, full-size finder hand-camera, an instrument which excited the wonder and praise of all who examined it ; the H. Lieber Co., of Indianapolis, made an attractive exhibit of frames and mouldings, and the following firms received their visitors at desks arranged around the auditorium : James H. Smith & Co., Chicago ; The Illinois College



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◆

The Philadelphia Salon.—Exhibitors are reminded that all pictures submitted for exhibition at this Salon are to be delivered at the Academy of the Fine Arts, Philadelphia, not later than October 2d. Communications, applications for entry forms, etc., should be addressed to the Academy, Broad Street, above Arch, Philadelphia.

◆

The forty-fourth annual exhibition of the Royal Photographic Society of Great Britain, will be held at 5A, Pall Mall East, London, September 25th to November 11th. American exhibits will not be charged for wall-space but transportation to and from the exhibition must be prepaid, and the exhibits must be delivered in London before September 5th.

This announcement is, of course, too late to be of use to any exhibitors on this side except those previously notified of the date set for the reception of exhibits, and it would seem desirable that foreign workers should have more ample notice than was given this year. We would like to see American photography more fully represented at this most prominent of British exhibitions, but such representation was impossible this year because of the short notice given of the dates involved. It is not too late to point out, however, that this exhibition is one which all American photographers visiting London during September and October should see, as comprising examples of the best work of many leading European amateurs and professionals. The Salon of the Linked Ring, open in London about the same time, is another "show" which should not be missed by those who have an opportunity to see it.

◆

The Latest.—We quote an advertisement now appearing in several British exchanges: "Photographs in the colors of nature, *Vicol* (British Patent; complete specification No. 12,678). A new printing-out paper for the instantaneous production of the most exquisite natural tints on portraits, landscapes, sea-views, archi-

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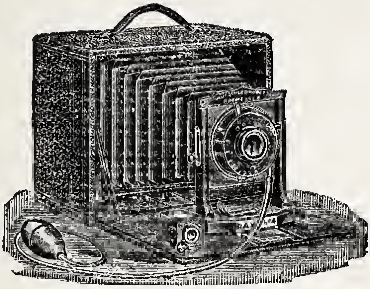

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❧

*Kromskop* Color Photography. As is generally known, the *Kromskop* is an instrument which records and reproduces the colors of nature, invented by Mr. F. E. Ives, of Philadelphia. It is announced that very important improvements have been made in the instrument, and that all the essential appliances for *Kromskop* photography will be ready for sale September 1st. Catalogues, particulars, etc., may be obtained from Frederic E. Ives, 1324 Chestnut Street, Philadelphia.

❧

For Cloud or Ray Filters it will be found that a one per cent. solution of chromate of potash, instead of the two or three per cent. bichromate solution usually employed, will give good results without increasing the exposure to the length required by the latter.

❧

The Haller-Kemper Co., of Chicago, has just issued an interesting list of the many photographic specialties of which it has the general agency. This firm's advertising matter is peculiarly rich in information concerning practical manipulation, a feature often lacking in manufacturers' instructions. From this last list we learn that the Haller-Kemper Co. has introduced a new line of pure chemicals such as C. P. dried sulphite of soda, granulated hypo-soda, etc., which are calculated to aid the amateur in securing uniformly good results in his dark-room work.

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❦

Messrs. Gauthier-Villars, Masson & Co., Paris, have just published two useful little volumes on *The Chemistry of Photographic Manipulations* by G. H. Niewenglowski. Part I. treats of the chemistry of negative processes ; each volume covering about two hundred pages and including a collection of standard formulas. The author deals with his subject from a scientific point of view, and for those who seek an exact knowledge of the basis of photographic manipulation these two volumes offer much valuable information. They are printed in French ; price, 50 cents each.

❦

Catalogues.—July was prolific in catalogues, many of them offering useful information beyond the mere prices current, and well worth careful perusal. As they may all be obtained for the asking, we note here simply their appearance and special features, asking those readers who apply for copies to mention this magazine as a means of securing prompt attention to their request.

The N. Y. Camera Exchange, 41 Fulton Street, New York, has issued its annual *Bargain List*. This firm specializes on "Exchanged Hand Cameras" and the list is full of opportunities for investment, the reductions on list prices of these cameras averaging forty or fifty per cent. The special offers on complete view outfits are also attractive and should be seen.

The Folmer & Schwing Mfg. Co., 271 Canal Street, New York, sends its 1899 catalogue, listing many new specialties of which amateurs should be informed, such as the *Graphic Magazine Plate Holder*, etc.

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Almer Coe, 65 State Street, Chicago, issues a tastefully printed list of the standard apparatus, such as *Kodaks*, *Premos*, *Montauks*, *Zeiss*, and *Collinear Lenses*, obtainable at his store. The firm, judged by its catalogue, is thoroughly progressive and offers its patrons an intelligent service.

James H. Smith & Co., 311 Wabash Avenue, Chicago, an old-established firm manufacturing many specialties of world-wide repute, send us their 1899 catalogue, a bulky volume of 175 pages, very fully illustrated. Among the novelties listed we find two of special interest to the readers of this and the July PHOTO-MINIATURE, viz.: a special printing frame for panoramic photographs, and a stereoscopic hand-camera of the magazine class. The list is well worth getting as a reference book.

The supply catalogue of Kirk, Geary & Co., Sacramento and San Francisco, is a good example of what such a catalogue should be, concise in make-up, well printed, and enclosed in an attractive cover. Every Pacific Coast amateur should have it on his shelf.

G. Gennert, 24 East 13th Street, New York, sends a revised edition of his general catalogue covering one hundred and fifty pages, giving special attention to the apparatus and supplies for which he has the sole American agency. Dr. Hauff's *Metol*, *Ortol*, *Metogen*, *Glycin*, *Fixing Cartridges*, etc., are all described in the various forms in which they are obtainable.

N. Watry, 99 E. Randolph Street, Chicago, has issued a neat price-list of the photographic goods he supplies, *Premos*, *Kodaks*, *Cyclones*, with "spot cash" prices which become interesting when compared with the list prices quoted in manufacturers' catalogues. An *Amateur's Catalogue* of which "net prices" are the special feature has also been published by O. H. Peck, Minneapolis, Minn., and should make this well-known house popular in the Northwest.

❧

The American Institute Photographic Salon, under the auspices of the Photographical Section, will be held at the new gallery of the Institute, New York, November 27th to December 18th. This is an exhibition which deserves the hearty support of amateur and profes-

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Full particulars, with entry blanks, etc., may be had on application to the secretary, J. W. Bartlett, M.D., 149 West 94th Street, New York. The exhibition gallery forms part of the rooms of the Institute at 19–21 West 44th Street, New York. Entry forms, duly filled, must be in the secretary's hands before Wednesday, October 25th.

◆

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The *Camera* for July announces a series of amateur competitions of interest to beginners. This bright little journal, which is the official organ of the Columbia Photographic Society of Philadelphia, has vastly improved

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A great deal of interest has been shown by advanced workers in the preparation of the September number of THE PHOTO-MINIATURE, dealing with *Orthochromatic Photography*. It will be the first little book on this subject and will, we believe, help toward a better understanding of the value of color-sensitive plates—which is altogether desirable.

* * *

Mr. Thomas R. Dallmeyer will issue in the fall a new book on *Tele-photography*. The two books previously issued by Mr. Dallmeyer have been out of print for some little time. It is said that in a search for suitable illustrations of long-distance work, Mr. Dallmeyer has photographed scenes on the Isle of Wight, from the English shore. As this is across twenty-two miles of sea it is a fair example of the capabilities of this class of lens; though we believe that one of the earliest of telephoto negatives—a view of Mont Blanc, by Boissonnas, of Geneva—was taken at a distance of more than forty miles.

* * *

One of the most interesting of recent communications on photography was made by Professor R. W. Wood, before the Photographic Society of Philadelphia on April 21st, on *Sound Wave and Color Photographs*; published in the *Journal* of the society for that month. Professor Wood's color-work is notable in that it is on somewhat new lines; he himself described his results as crude in the extreme; being the result of first desultory experiments. But the attainment of success lies apparently in the overcoming of mechanical difficulties in photographing diffraction gratings—which are glasses ruled with lines of from 2,000 to 3,000 or more lines per inch. The result is new in that the color is obtained in a single print, without the use of color screens. The print, however, does not reveal the color until it is viewed in a specially constructed instrument.

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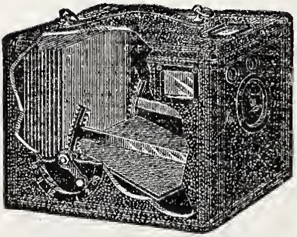

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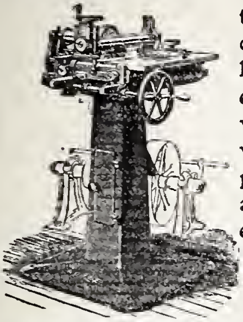

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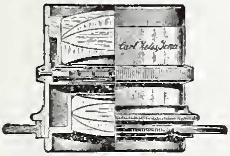

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*A Magazine of Photographic Information*

Edited by John A. Tennant

Vol. I SEPTEMBER, 1899 No. 6

## ORTHOCHROMATIC PHOTOGRAPHY.

What is orthochromatic photography? In what does it differ from the everyday photography with which we are familiar? And what are its practical advantages? Here we have three typical questions often asked concerning a matter of very great interest to all who photograph, but which cannot be satisfactorily answered without recourse to advanced text-books, wherein the subject is necessarily discussed with more or less technical precision. This little manual is intended to supply the need here indicated; to lift orthochromatic photography out of the text-books, and popularize it by offering a simple explanation of its meaning, its methods, and its advantages over the method now generally used. And since I write for those who know comparatively little or nothing about the subject, I must ask the patience of those who have already passed the first steps if I seem to devote more space to explanation than to details of manipulation.

The word orthochromatic is compounded from two Greek words, *orthos* = correct, and *chroma* = color. Isochromatic, widely used as an alternative word, is similarly derived from two Greek words, *isos* = equal and *chroma*. We will see later that neither of these words properly describes the significance of "orthochromatic" photography; but since they are commonly accepted, so they are used here. As popularly understood, orthochromatic photography is a method which gives a more correct rendering of the "color-values" of objects than can be had with the ordinary dry plate commonly used in photographic work. The term "color-values," however, has misled many into the erroneous belief that it is possible to represent color-contrasts (differences of hue) in objects by differences of tone in the photograph—a manifest absurdity. We begin, therefore, with a better definition, viz., that orthochromatic photography is a method which aims to give a correct record in monochrome of the relative brightness of objects as seen by the eye, regardless of their color. That we have here a distinction with a vital difference will be apparent as we proceed.

**Luminosity—the key.**

Let us recall a few familiar facts. We know that modern photography is based upon the action of light on the sensitive film of the gelatine-bromide plate—the ordinary dry plate or "film" of the stores. We also know that photography, being a monochromatic method of reproduction, cannot give us a direct record of the colors seen in almost everything we photograph. In looking at anything showing several colors, however, we know that the eye differentiates (separates as different from each other), *first*, the contrasts of color, *i.e.*, the differences of hue, and *second*, the contrasts of light and shade, *i.e.*, the relative brightness (luminosity or light intensity) of objects compared with one another under the existing conditions of illumination, and quite apart from their color. For example, if we look at a scene showing green trees, and a blue sky flecked with white clouds, the eye perceives (1) the differences of hue (contrasts of color) between the green of the trees, the blue of the sky, and the white clouds ; and also, (2) the relative brightness (contrasts of light and shade) of the white clouds compared with the blue sky, and of the latter compared with the green trees. Now, as it is obviously impossible to render color-contrasts (differences of hue) in monochrome, we have only light and shade left, and it clearly follows that, if the photographic plate is to record what the eye sees, it must correctly represent the contrasts of light and shade (the relative luminosities) of the scene in their proportionate intensities as seen by the eye, no matter what the color may be.

**Wherein ordinary plates fail.**

This, however, photography by the ordinary method cannot do, and its failure to correctly represent the relative luminosity or "eye-value" of objects is its most serious defect. Thus we know that if we photograph, as we sometimes have to do in portraiture, ribbons showing the colors red, yellow, and blue, all *of equal brightness* or brilliancy to the eye, our photograph represents the red as darkest, the yellow almost as dark as the red, and the blue much lighter than either the red or the yellow. Or if we photograph violet and bright yellow pansies together, the photograph represents the yellow pansy as the darker of the two, although to the eye it is much brighter (more luminous) than the one of violet hue. Similarly, if we photograph a scene with a foreground of trees in autumn garb, and a blue sky with clouds, the trees in our photograph usually appear darker than they seemed to the eye, and the sky is often represented by a blank white space. We must be careful to recognize that in these instances the plate has failed to record the *luminous values* of the objects; it has nothing to do with the colors of things simply because color is a purely physiological effect, peculiar to the eye. Thus, if we photograph colored objects having the same degree of luminosity to the eye, we can only represent these luminosities correctly by equal degrees of opacity in our negative. If we seek to render differences of hue by differences of tone we will produce a false record where the luminosities are equal, for in such a case the objects have the same intensity to the eye apart from their color, and their difference of hue can only be represented by color or pigment, not in monochrome. Now, if we think for a moment of the important part color luminosities play in all nature and art, we at once realize how grievously defective is the ordinary photographic plate, inasmuch as it not only fails to give us a color-record of what we see, but also to correctly represent the relative luminosity of objects—the gradations of light and shade in colored objects as the eye sees them. This defect is popularly explained by the assertion that the photographic plate is over-sensitive to certain colors (violet, indigo, blue), and but feebly sensitive to others (green, yellow, red), so that the first impression the plate before the latter have time to do their work. Here, again, we have confusion of terms which leads to misunderstanding, for, as we will see, the defect of the plate is due to its lack of luminosity sensitiveness, and has nothing to do with color.

**Light.**

Let us clearly understand what we mean by light and color. Light is a sensation produced by the vibration of the so-called ether, a medium which pervades all space and penetrates all bodies. These vibrations are propagated with great velocity through space and in transparent bodies in the form of undulations or wave-motions, such as the undulatory motion observed when the wind sweeps over a field of ripening corn. When these waves thus travelling through the ether impinge upon the eye, their motion communicates itself to the nerves and produces the sensation we call light. It is important to keep this in mind—that what we speak of as light is only wave-motion until it has impinged upon the retina. When these waves impinge upon and communicate their motion to other substances, the result depends upon the nature of the substance, and may take the form of development of heat, or the production of chemical changes. For convenience we will use the word *light* to denote the *sensation*, and the expression, a *beam of light* or a *ray of light* to denote *wave-motion* in the ether, which may or may not produce light according to circumstances.

**The Spectrum.** If we cause a beam of sunlight to pass through a fine slit-like opening in the window-shutter of a room completely darkened, and place a white screen opposite the slit-like opening at some distance away, we get on the screen a narrow band of white light. If now we interpose a glass prism, in the path of this beam of light, as shown in

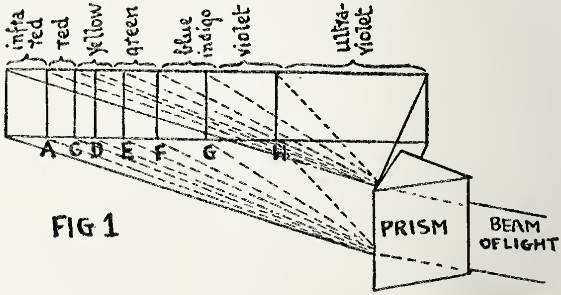

FIG 1

Fig. 1, something very wonderful happens. The single ray or beam of light is not only refracted or bent out of its original course, but is also broken up or decomposed, so that, instead of the narrow band of white light, we get on the screen a stripe or ribbon made up of

REFLECTED LIGHTS. L. A. Weigel, M.D.

WIND-SWEPT DUNES. C. Grant La Farge

THE WILLOWS. Chas. P. Marshall

IN THE GARDEN OF THE GODS COLO. Will H. Hatch many bands of color crossing from side to side of the stripe, and apparently melting into each other. This is the solar spectrum and, as we can recompose all these bands of color to form white light, it teaches us that what we call white light, with which we see and photograph, is a combination of many rays capable of producing different color sensations which, in their simultaneous effect on the eye, produce the sensation of "whiteness." The different color bands in the spectrum, as the eye sees them, may be divided into red, orange, yellow, green, blue, indigo, and violet. These form the visible spectrum ; there are other bands beyond the red at one end, and beyond the violet at the other. These are invisible to the eye, but are the result of wave-motion, although they do not result in light as we understand it.

**"Color" is wave-length.** It is found that the power of the different rays to produce color sensations is due to a difference in the length of the waves of which the rays are constituted, a wave-length being the distance between the crests of two consecutive waves in the same ray. The prism, then, is simply an analyzer, and sorts out the rays of different wave-lengths so that all the rays of approximately the same wave-length are together in order. The spectrum is, as it were, a map in which the different rays constituting white light are arranged in order according to their wave-length. These wave-lengths are, of course, exceedingly small, but they have been measured, and it is known that the violet-producing rays have the shortest wave-length, and that the wave-length of the rays increases as we pass along the spectrum from violet to red, which latter color-sensation is produced by the rays of greatest wave-length in the visible spectrum. The invisible rays beyond the red band are known as *infra red;* those beyond the violet band are known as the *ultra violet.*

**Fraunhofer Lines.** Although the various bands of color seem to blend into each other in a continuous stripe, we know that the whole spectrum is crossed by innumerable fine black lines, called *Fraunhofer lines*, after their discoverer. Fraunhofer gave the more prominent of these lines significance as points of reference or landmarks by attaching to them the letters of the alphabet. Thus the line at the end of the visible red is A, B denotes the bright red, C the orange-red, D the bright orange-yellow, E the yellowish-green, F is in the greenish-blue band, G in the full or indigo blue, and H at the limit of the visible violet. Beyond these there are lines in the *ultra-violet* region named K, L, M, N, etc. Fig. 2 shows a diagram of the spectrum with the principal Fraunhofer lines in their correct positions. By coloring this diagram with brilliant colors according to a color chart of the spectrum, such as may be found in any encyclopedia, the reader will perhaps be enabled to follow this explanation more easily than without the aid of color. From what has been said thus far it will be perceived that (1) color is simply the sensation produced in the eye by light rays of different wave-lengths, the color depending upon the wave-lengths of the ray impinging upon the retina, and (2) that the rays between the Fraunhofer lines bounding any single section or band of the spectrum are rays of approximately the same wave-length.

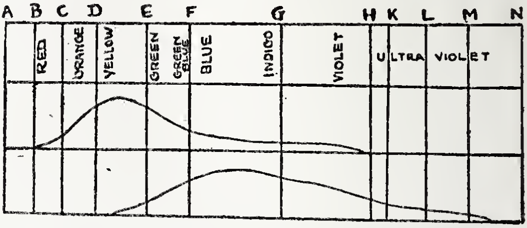

FIG 2

FIG 3

FIG 4

**Absorption and Color.** If we now interpose a piece of ruby glass in the beam of light before it reaches the prism, we see that only the red rays from A to C appear on the screen, all the others having apparently been extinguished. They have been absorbed by the red glass, and if we collect the varying bands of red seen upon the screen so as to recombine them, we get the color of the ruby glass. Similarly, if we interpose in the beam of light a flask holding a solution of bichromate of potash we get on the screen the red, orange, yellow and green rays, while the blue, indigo, and violet are absorbed by the solution. These red, yellow, and green rays combined give us the color of the bichromate solution—a deep orange to the eye. This absorption of rays of light is, so to speak, a wiping out or extinguishing of certain wave-lengths of light, and it is by this means that we arrive at the cause of objects being of this or that "color" as we express it. No known substance possesses color of itself, but "color," the hue of anything, results simply from the action of the substance upon the light falling on it, All bodies have the power to absorb light, and they have this power in a selective way, *i.e.*, they absorb certain light rays and transmit or reflect others. It is the effect produced in the eye by the rays an object transmits or reflects which constitutes the characteristic "color" of the object. Or, to put it in another way, all substances have the power to absorb light rays of certain wave-lengths, and to transmit others (or reflect them) which, of course, have different wave-lengths. The hue or "color" of the object depends, therefore, upon the wave-length of the rays transmitted or reflected. As a matter of course we know that a large amount of white light is reflected from the surfaces of all bodies, hence the colors of natural bodies are rarely as pure as those seen in the spectrum. Nevertheless the dominant color intensity determines the characteristic hue of what we see. The choice of the light used in our dark-rooms is determined by this test of absorption. In order to work with light-sensitive plates in safety and comfort we must necessarily secure illumination which, while permitting us to see what we are doing, exerts no effect upon the sensitive film. Hence we choose glass for the window or the lantern which will absorb all the light rays to which our plates are sensitive, and transmit only those rays of little or no photographic intensity. We must remember this when we come to color-screens or ray-filters, and also in the manipulation of orthochromatic plates, which possess a greater degree of sensitiveness to the bands of the spectrum (as far as luminosity is concerned) than that possessed by ordinary plates.

**Spectrum Luminosity.** To the eye the various bands of the spectrum differ not only in hue (color contrasts), but also in brightness or degree of light or shade (color luminosity). Thus we say that the golden yellow, close to the line D, is the most luminous (has the greatest visual intensity), while the violet or indigo band at G is the least luminous, (or darkest to the eye). In Fig 3 we represent the relative luminosities or "eye values" of the spectrum bands by a curve which ascends or descends according as the band through which it passes has more or less luminosity. It is obvious that if we can make our plate record in correct gradations of opacity the relative luminosity of all parts of the spectrum, our photographs will faithfully reproduce the luminosity of all objects as the eye sees them, regardless of the color. In other words, in order to correctly represent the luminosity of objects, apart from their color, the photographic plate must be sensitive to the rays of different wave-lengths in the visible spectrum proportionately to the light intensity of those rays to the eye.

**Chemical Effect of the Spectrum.**

Let us photograph the spectrum, using an ordinary plate, and see how far the plate is sensitive to the varying light intensities observed in different portions of the spectrum. We cut the plate twice as long as the visible spectrum before us, and place it in the holder so that the spectrum image will occupy the middle of the strip. Upon examination the spectrum negative so obtained shows a band of opacity far below the line H, so that we see that the ultra-violet rays, though invisible to the eye, have a marked effect on the plate. We find absolute opacity at and around the line G, in the indigo-violet band; the opacity decreases as the line F in the greenish-blue band is approached, decreases still more rapidly from F to E, and from the E line to and beyond A (from the greenish-yellow through the orange and red bands) in the spectrum negative we have clear glass, showing that those rays beyond the green have little or no action on the plate. If we make a curve representing these gradations of opacity in the different bands of the spectrum negative, we will get what is shown in Fig 4, the degree of opacity in each section of the spectrum negative being proportionate to the sensitiveness of the plate to the luminosity of the different bands. Comparing this curve of the plate's sensitiveness with the curve of spectrum luminosities, we see why it is that the plate fails to correctly render the luminosity of colored objects. The plate is over sensitive to the light rays of shortest wave-lengths, from the *ultra-violet* below H to the blue about F, and lacks sensitiveness to the rays of greater wave-lengths, from E to B, greenish-yellow and bright red bands, or almost in reverse order to the "eye values" or luminosities of the spectrum bands. The difference here revealed between the curve of sensitiveness of the ordinary plate to the spectrum, and the curve of luminosity is so enormous that we ask ourselves how it is that our photographs are as satisfactory as we know them to be. This is explained, in part, by the fact that all objects reflect a large amount of white light in addition to the rays of color by which we identify them, so that we do not ordinarily have to deal with color luminosities as forceful as those seen in the spectrum, and also because we have, in some measure, accustomed ourselves to the imperfect gradations of the photographic record. Nevertheless, the test is a true one, and if we attempt to photograph near objects showing brilliant colors, such as draperies, flowers, paintings, etc., the lack of luminosity sensitiveness in the ordinary plate will be readily apparent. In outdoor work also, the discriminating eye will easily detect the inadequate representation of the delicate shades of green, yellow, and red in foliage, the exaggerated effects of haze and distance, and the lack of luminous values in the sky.

**The Problem.**

To sum up briefly: We know that light-rays of different wave-lengths have in the spectrum different degrees of luminosity, and that the ordinary plate fails to correctly represent these luminosities because it is over-sensitive to the rays of shortest wave-lengths which have feeble luminosity, and lacks sensitiveness to the rays of greater wave-lengths and higher luminosity. What we want in order to get photographs of things as the eye sees them is a plate sensitive to all the wave-lengths of light in proportion to their luminosity. The practical way to accomplish this is to increase the sensitiveness of the plate to the wave-lengths of light beyond E in the spectrum—to the green, yellow, and red rays, and at the same time depress the too great activity of the short-length rays below F in the spectrum—the blue, indigo, violet, and ultra-violet rays. This is the problem solved by orthochromatic photography.

**Absorption and Chemical Action.**

When we had the spectrum on our screen we observed that certain substances (as the red glass) absorbed some light rays and allowed others to pass. Now it is a law that in order that the wave-motion of the ether may produce any effect, or do work as we express it, on a substance, it must be absorbed or taken up by the substance. This holds good for photographic as well as for other effects. Dr. J. W. Draper, of New York, was the first to announce that "the chemical action produced by rays of light depends on their absorption by sensitive bodies." This announcement, made in 1840, was the first step toward orthochromatic photography. In 1870 Schultz-Sellack demonstrated that this theory held good when applied to the sensitive salts of silver used in photography.

**Vogel's Discovery.**

In 1873 Dr. H. W. Vogel, of Berlin, observed that collodio-bromide plates, stained with a yellow dye, gave a more correct rendering of the luminosity of the yellow band of the spectrum than had been obtained with undyed plates. From this he formed the hypothesis that it was the dye in the film which caused this difference, and that it was the selective absorption by the dye of the yellow-green rays which caused the selective sensitiveness of the plate to these rays. After further investigation he announced, in 1873, that if bromide of silver be dyed with certain yellow or red dyes its normal sensitiveness to the yellow and green rays of the spectrum is thereby much increased—and so orthochromatic photography was born. This discovery, which made it possible to sensitize plates with a wider range of sensitiveness to the more luminous portions of the spectrum, was taken up with enthusiasm by many scientists, such as Eder, Abney, Carey Lea, Becquerel, and others, and in 1876 Captain Waterhouse pointed out that *eosin*, one of the coal-tar dyes, was a sensitizer of special value for the purpose under discussion.

**Chlorophyll Process.**

In 1879 F. E. Ives (of Krōmskōp fame) published in the *Philadelphia Photographer* the first practical orthochromatic method. This consisted in staining a collodio-bromide plate with an alcoholic solution of chlorophyll (the green coloring matter of leaves), by which he obtained a plate sensitive to all the color bands, or wave-lengths of light, in the visible spectrum. Referring to this process in a letter recently received, Mr. Ives says: "The method is rapid enough to be successfully used in commercial photography. Of course, the rapid color-sensitive dry plates of to-day are far more convenient to use, and many times more sensitive, but the best of them will not give better results than I got in 1878." Its use involves a knowledge of the collodio-bromide process.

While Vogel, Eder, and others were busy with the new problem of orthochromatism (applied, of course, to the dry collodion plates of that day), the gelatine-bromide dry plate was introduced, and for some time absorbed the attention of the photographic world. Orthochromatic photography was, therefore, put aside and seemed to have been forgotten. In due season, however, the remarkable rapidity of the then new dry-plate awakened curiosity as to its possibilities in the representation of color luminosities, and the old lines of research into the action of dyes were taken up with renewed vigor.

**Modern Orthochromatics.**

In 1882–83, Tailfer and Clayton, of Paris, patented a method of making the gelatine bromide dry plate "color-sensitive" by the use of eosin. This method, with important improvements which increased the keeping quality of the plates, about which there had been complaint, was commercially introduced into England in 1884 by Messrs. B. J. Edwards & Co. The practical use of the process was instantaneously appreciated by continental houses engaged in the reproduction of paintings, and Vogel's method was largely employed. In 1886 John Carbutt of Philadelphia, began the commercial preparation of orthochromatic plates for American workers; Forbes, of Rochester, entered the field very soon after Carbutt, and was followed by Wuestner. Later the G. Cramer Dry Plate Co. of St. Louis purchased the Edwards' process, still further improved it so that the use of "color-screens" was largely done away with, and introduced it under the title of Isochromatic photography. In France the brothers Lumière, of Lyons, have recently introduced a series of color-sensitive plates very completely meeting the increasing demand for plates selectively sensitized for separate portions of the spectrum; and in England, among several commercial processes, special mention should be made of the orthochromatic system (comprising plates, color-screens and dark-room lights) introduced by Cadett and Neall, in which for the first time the photographer has a practical and intelligent method of working toward a correct record of all color luminosities. The most recent commercial introduction in this direction is the

*Erythro* plate of the International Color-Photo Co., of which, as well as of the others mentioned, particulars are readily obtainable from the various manufacturers.

Let us now resume our inquiry into the methods used in the preparation of orthochromatic plates. Since Vogel's first announcement of his discovery, hundreds of dyes have been examined, and their action as sensitizers investigated and published. The literature of the subject is one of the most interesting chapters in the story of photography, but we cannot do more here than glance at a few of the principal dyes and their properties as sensitizers.

**Dyes used as Sensitizers.**

*Eosin* (yellow shade) as used in photography, is generally the potassium salt of tetra-brom-fluorescein ($C_{20} H_8 Br_4 O_5$).* It is a dark red powder, very soluble in water. By transmitted light its solution is a beautiful red, but by reflected light it appears yellowish-green, a property which is known as fluorescence. If its solution is added to a solution of silver nitrate a red precipitate of eosin of silver, soluble in ammonia, is formed. This property we will refer to later.

*Eosin* (blue shade) is the sodium salt of tetra-iodo-fluorescein ($C_{20} H_8 I_4 O_5$). It will be noticed that this salt contains iodine while the eosin (yellow shade) contains bromine. It is not considered as good a sensitizer as the yellow shade. This variety of eosin was first used by Waterhouse, and gives added sensitiveness to the plate for the yellowish-green and yellow rays, which, we recall, are the most luminous rays of the spectrum.

*Erythrosin* ($C_{20} H_6 I_4 O_5 K_2$). This dye, one of the most important in orthochromatic photography, has a composition similar to eosin (blue shade). It is especially valuable to the worker who desires to prepare his own plates, for which we will offer a method later. Like the eosin dyes, erythrosin forms a red precipitate of erythrosin silver, soluble in ammonia, which is of great value as a sensitizer. An erythrosin solution has the

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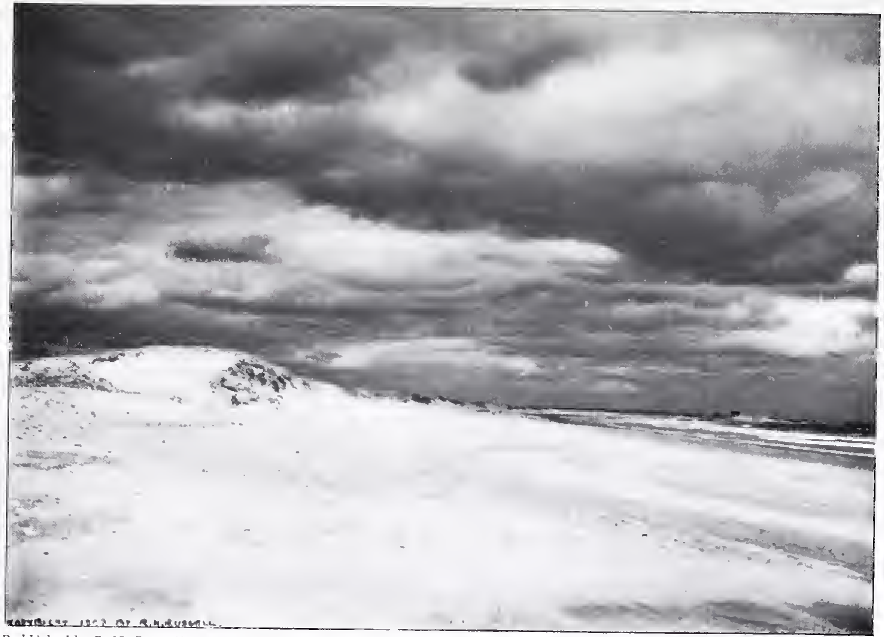
* In these chemical formulæ C is the symbol for the element *carbon ;* H for the element *hydrogen ;* O for *oxygen ;* Cl for *chlorine ;* Br for *bromine ;* K for the metal *potassium ;* N for *nitrogen ;* and I for *iodine.* The figures after each letter denote the number of atoms of each element which have entered into the combination.



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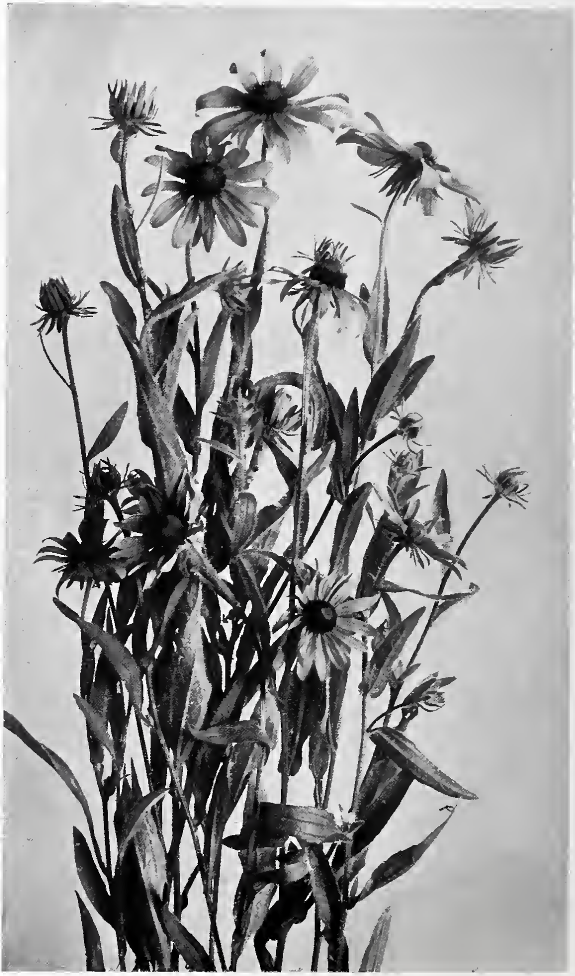
NARRAGANSETT BEACH. C. Grant La Farge



BLACK-EYED SUSAN. Hy. Troth

same appearance as an eosin solution when viewed by reflected light, but does not as a rule exhibit fluorescence.

*Cyanin* ($C_{28} H_{35} N_2 I$), also called *quinoline blue*, is one of the best dye-sensitizers for the orange and red rays. Eosin (yellow shade), eosin (blue shade), and erythrosin are sensitizers for the green and yellow rays. Cyanin is generally found in trade in the shape of small crystals, not very soluble in cold water, but readily soluble in alcohol, yielding a beautiful blue solution. This solution, in common with almost all dye-sensitizers, is very sensitive to light and unstable.

*Quinoline Red.* I include this dye because a mixture of it and quinoline blue (cyanin) formed the famous azalin placed on the market by Dr. Vogel and held as a trade secret until its composition was published after analysis by Drs. Mallmann and Scolik.

*Chlorophyll*, as already stated, is the green coloring matter of plants and trees. The changing color of leaves in autumn is due to the breaking up and transformation of this pigment. It is used as a general sensitizer for all the rays of the spectrum with the maximum in the yellow and orange rays. (Used almost exclusively in the collodion process.)

*Rose des Alpes.* Recent experiments by Punnett show this dye to be a good sensitizer, its action being similar to that of erythrosin but not as strong. Its solution (aqueous) is of a beautiful red color.

*Rose Bengal* ($C_{20} H_4 Cl_2 I_4 O_5 K_2$) is another dye of the eosin group. Vogel claimed that it did not give satisfactory results while Bothamley says that although not as powerful a sensitizer as erythrosin its effect is more uniformly distributed and approaches the curve of luminosity more closely than erythrosin.*

The effects produced in the gelatine-bromide plate or emulsion by these dyes cannot be more clearly shown than by the curves of spectrum sensitiveness given in the accompanying diagram, Fig. 5. (*a*) represents the curve of spectrum sensitiveness of an ordinary dry plate, (*b*) the increased sensitiveness gained by the use of cyanin, and (*c*) the effect of the use of erythrosin.

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*As it is sometimes difficult to obtain the dyes mentioned herein in the smaller cities, I give a list of firms from one or another of which may be obtained all the dyes referred to in these pages. A very small quantity of dye will be found sufficient for

**Application of the Dyes.**

There are two methods generally employed in using the dyes to impart special sensitiveness to plates. The first, used by manufacturers most largely, is to add the dye solution to the emulsion during its preparation, or just before coating the plates. Of this method nothing needs to be said here. The second method, of more importance to those who desire to orthochromatize their own plates, consists in bathing or soaking ordinary dry plates in the dye solution. Both methods, with care, will give equally good results, but plates prepared by the second method lack keeping quality, and hence must be used within a few weeks of their preparation.

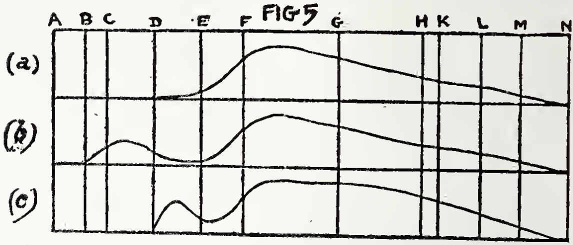


FIG 5

In beginning to orthochromatize ordinary plates two points should be remembered. *First*, that other things being equal a plate of medium rapidity is more susceptible to the sensitizing action of the dyes than an "extra-fast" plate. *Second*, all dry plates contain a certain proportion of iodide of silver along with the bromide of silver. Some plates contain more iodide than others, and the presence of more than a certain proportion of iodide, say more than three per cent., is detrimental to the best results when orthochromatizing. Unfortunately there is no simple method of gauging what amount of iodide any given brand of plate contains, but the yellowness or whiteness of a plate examined in daylight constitutes a rough test. If the plate has a full yellow color it may be presumed to contain iodide and should

all purposes—say 10 to 25 grammes. George Murphy, 57 East 9th Street, New York; Farbenfabriken of Elberfield Co., 40 Stone Street, New York; Pickard & Kutroff, 98 Liberty Street, New York; Eimer & Amend, Third Avenue, New York; Henry Heil Chemical Co., St. Louis; Sargent & Co., Chicago; Hopkins & Williams, London.

not be used for "color sensitizing." The whiter the plate by this test the better may the results of orthochromatizing be expected to be. But, as I say, this is only a rough test, and not necessarily correct, since the cooking of the emulsion (a process in dry plate manufacture) will often impart a yellow tinge to the film. The presence of a considerable amount of iodide in a plate, by the way, increases the sensitiveness of the plate slightly to the yellowish-green rays, and hence when we hear of ordinary plates giving orthochromatic effects (as some do in a limited degree) we may reasonably conclude that such plates have an excess of iodide.

**Bath Process.** With regard to the light used in the manipulation of orthochromatic plates, it is obvious that the greenish-yellow light used in some dark-rooms is not permissible. When we sensitize plates for red, even a ruby light must be carefully handled if the plates are to be kept free from fog or veil. With a deep ruby light, however, one may safely work with eosin dyes or erythrosin, always remembering that it is wise to expose plates, whether ordinary or orthrochromatic, to the least amount of direct light consistent with proper manipulation. Here is the method of working: In the dark room with a table standing against the wall tack a long strip of blotting paper, at least three inches wide, along the table, at such a distance from the wall that when the bathed plates are placed to dry leaning at a convenient angle, the lower edge of the plate comes in the middle of the strip. Opening the box of plates in deep ruby light, dust them carefully and lay one in a *clean* porcelain tray. Over it pour the dye solution to about the depth of an inch. Give the tray a slight shake to break up any air bubbles which may have formed on the film of the plate, cover it with a piece of opaque card, and gently rock until the time determined for bathing has expired.

On taking the plate out of the tray, let the excess of solution run back into the tray, and then lean it, face in, against the wall with its lower edge resting on the strip of blotter, which will absorb the surplus solution. By this method one avoids dark marks at the lower edge of the plate. The plates should dry in absolute darkness. A good plan is to bathe them at night, and let them dry in the dark room until morning, taking care to completely darken the room. Of course the dark room must be arranged so that one can leave it and re-enter without admitting white light. Where this is not possible the plates must be dried in a light-tight box so constructed as to permit of abundant ventilation.

In orthochromatizing a commercial plate by the bath method a good deal depends upon the carefulness with which the bathing or soaking of the plate is accomplished. This is especially applicable where the plate is treated with two baths instead of a single soaking. Thus, if the plate, after being dusted, is plunged direct into the dye-solution the first and most important point is that the film shall be thoroughly and uniformly imbued with the solution. This depends, of course, upon the length of time the solution is allowed to act, and the latter, again, varies with the character of the film treated. Thus a film consisting of soft gelatine will absorb the solution more rapidly, and perhaps, also, more uniformly, than one in which a harder gelatine has been employed or chrome alum has been added. Some films, too, show a persistent "greasiness" upon wetting, especially where no ammonia is used in the solution, and may be soaked for a long time before the liquid runs in anything like an even manner from the surface.

Until this occurs it is scarcely possible to hope for uniformity of action, and if the soaking be prolonged in either the coloring solution or that of silver nitrate sufficiently long to produce that effect, then it is probable that the photographic or orthochromatic properties of the plate may be injuriously affected. We would recommend, then, that the plate be first soaked in distilled water until the film is thoroughly softened, and the water runs evenly over the surface without streaks or grease-like markings. When the latter occur, a broad camel-hair brush passed over the surface will prove an assistance, or, better still, a pad of picked absorbent cotton thoroughly wetted may be applied with some force until the water takes "kindly" to the whole surface. In some cases, especially when the film is composed of a particularly hard gelatine, or the plate has been long prepared, it may be advisable or necessary to render the water very faintly alkaline with ammonia, or where the latter is objectionable a small quantity of glycerine may be added. In either of these cases, however, a final rinse in plain distilled water should be applied before immersing the plate in the coloring or color-sensitizing solutions.

The film after this treatment is in a condition to absorb whatever subsequent solutions are applied to it more uniformly, though less rapidly, just as a plate soaked in water before development developes more slowly, though with greater regularity. It will also permit the superfluous liquid to drain away more evenly without standing in beads or drops ; though in order to promote absolute uniformity we prefer to pass a very soft, pure black rubber squeegee *once* over the surface of the plate, and so remove all superfluous solution. It is needless to say that this should be done without pressure. The camel-hair brush or pad of cotton wool are objectionable for this purpose, as they are apt to leave the solution in streaks.

Another advantage of the preliminary soaking, and perhaps the greater, is that any soluble matter that may exist in the film through imperfect washing of the emulsion is by this means eliminated. Slight traces of soluble bromides or nitrates in a film plunged directly into the coloring solution would no doubt exercise some influence of one kind or another ; but, whether beneficial or otherwise, they are better removed, as likely to lead to uncertainty in using different batches of plates. Another substance likely to be found in some films is chrome alum, and this, too, would be advantageously removed without destroying the effect for which it was originally added to the emulsion. In fact the preliminary soaking in distilled water seems calculated to give us a cleaner and purer basis to start upon.

**Erythrosin Bath.**

There are three kinds of erythrosin baths which may be used for our purpose, each having its advantages and disadvantages. The first step is to prepare a stock solution A as follows : Erythrosin, 16 grains ; distilled water, 16 ounces. This is a bright red solution. *Bath No.* 1, is prepared by adding 8 ounces of distilled water to 80 minims of A. The plates to be orthochromatized are bathed in this solution from two to three minutes. Such plates have good keeping qualities but are not as strongly sensitive as plates prepared with Baths Nos. 2 and 3. *Bath No.* 2 is a double solution. The plates are first bathed for two minutes in 1 dram stronger water ammonia added to 8 ounces of water. (By stronger water ammonia is meant that known to the trade as U. S. P., 1890, 26° Baumé, and containing 30% ammonical gas.) When taken from this bath the plates are immersed for one minute only in the following solution : stock solution A, one-half ounce ; distilled water, 8 ounces ; stronger water ammonia, 80 minims. This bath gives a better range of sensitiveness than No. 1, but the plates will not keep their quality as well. If the plates bathed were from a clear working batch of emulsion, they will begin to fog two weeks after being orthochromatized. *Bath No.* 3. Prepare a solution of silver nitrate, 10 grains ; distilled water, 16 ounces, and label it B. To make the sensitizing bath mix by weak daylight or gaslight the following solution . Distilled water, 8 ounces; stock solution A, 1½ ounces ; stock solution B, 3 ounces ; stronger water ammonia, 1 dram. With this bath and a good clear working plate to begin with, an orthochromatic plate equal to the best in the market can be produced. They have the fault that they will not retain their orthochromatic value more than a week under average conditions. The mixed solution should be protected from light. The plates are to be bathed two minutes ; if they incline to fog use a little less of the silver solution.

Dr. E. Vogel points out that, in order to make plates which will keep in summer, the quantity of ammonia usually used should be decreased. Either of the two following solutions may be used.

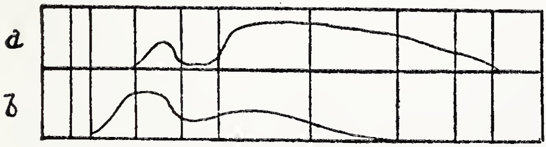
No. 1. Erythrosin solution (1 : 1000), 50 parts ; distilled water, 150 parts ; ammonia, 1–2 parts ; or No. 2. Erythrosin solution, 50 parts ; distilled water, 300 parts ; solution silver-nitrate (1 : 1000), 50 parts ; ammonia, 2 parts.

**Cyanin Bath.** Sometimes it is desirable to sensitize a plate for the orange and red rays chiefly. Cyanin is the best dye for this purpose, although I have never obtained results with it as successful as others have claimed. V. Schumann, of Leipsic, who has probably investigated this dye more than anyone else, gives the subjoined method : Soak the plates for two minutes in a bath of stronger water ammonia, 2 drams ; distilled water, 16 ounces. It is then bathed in the following solution : Distilled water, 16 ounces ; alcohol, 6 drams ; stronger water ammonia, 2½ drams ; and 6 drams of an alcoholic solution of cyanin (1:500). This alcoholic solution of cyanin can be made to approximate 1:500 by dissolving 4 grains of cyanin in 4 ounces of alcohol. Burton recommends an ammoniacal bath, simply prepared, as follows: Alcoholic solution of cyanin (1:1000), 1 part; ten per cent. ammonia, ½ part; distilled water, 8½ parts. The plates are bathed in this for two minutes, washed in a bath of distilled water to remove the superfluous dye, and the film rubbed with a tuft of absorbent cotton to ensure rapid and uniform drying.

**Eosin-Cyanin Bath.** Take of alcoholic solution of cyanin (1:500), 2 parts; alcohol, 20 parts; aqueous solution of eosin (1:500), 15 parts; distilled water, 165 parts; and 2 parts of stronger water ammonia. The plate should be bathed in this bath two minutes; the only light permissible is that coming through several thicknesses of brown (not red-brown) tissue-paper. The solution gives sensitiveness to the green, yellow, orange, and red rays in this order, but not to as great an extent as is desirable.

With these instructions the reader may experiment in the preparation of his own orthochromatic plates, and find pleasure and interest in his experiments. On the grounds of economy and convenience, however, the excellent commercial orthochromatic plates are preferable for everyday needs, and they may be had in varying degrees of sensitiveness to the different portions of the spectrum.

FIG 5a



a. Eosin dyed plate
b. Eosin dyed plate with yellow screen

**"Color Screens," Ray Filters.** We now know that, by the use of certain dyes, we can materially increase the sensitiveness of our plates to the green, yellow, and red rays, and so gain a decided advantage in correctly representing the color luminosities of objects. But, if we again photograph the spectrum, using this time an orthochromatic plate, we will find that its sensitiveness to the blue, violet, and ultra-violet rays is still excessive even when compared with its increased sensitiveness to the more luminous green, yellow, and red rays. Thus Fig. $5^a$ shows the curve of sensitiveness of an eosin-dyed plate. There is still a wide difference between this curve and the curve of spectrum luminosity seen in Fig. 3. As we have at present no means of overcoming this discrepancy, *i.e.*, no dye which will make the plate sensitive to all the spectrum rays proportionately to their relative luminosity, and at the same time be rapid enough for general use, it is necessary to subdue or diminish the action of the blue, violet, and ultra-violet rays.

This is accomplished by interposing between the object and the plate (generally before or behind the lens, or in the diaphragm slot of a doublet lens) an absorption screen or ray filter, commonly known as a "color screen," or "yellow screen." It is, however, possible to obviate the necessity of this screen by staining the film of the plate with a yellow dye and thus incorporating the screen with the film. Plates so treated are, of necessity, slow, and can hardly give full orthochromatic effect. The fixed depth of the screen is also a disadvantage, for, as we will see, there are times when the screen may be dispensed with, or when different depths of color are desirable, hence it is usual to employ a separate screen.

If we examine with a spectroscope the light passed by a yellow screen (a piece of yellow glass, for instance), we will see that the ultra-violet rays are wholly absorbed or extinguished, while the violet, indigo, and blue rays appear only faintly, having been partially absorbed by the screen. This explains why the use of a screen lengthens the necessary exposure, the light reaching the plate being robbed, in a greater or lesser degree, of those rays to which it is normally most sensitive.

**Kinds of Screens.**

There are three kinds of screens, *first*, those consisting of a film of dyed balsam, collodion, or gelatine coated upon glass plates or sealed between two plates of convenient size, such as the *Carbutt* and *Ideal* screens. In another form the dyed film of collodion or gelatine is attached to the diaphragm or inserted between a hinged diaphragm of special construction to fit between the elements of doublet lenses. *Second*, those consisting of colored solutions held in a glass cell or trough formed by two parallel glass plates slightly separated, such as the Bausch & Lomb *Ray Filter;* and *third*, those made of colored glass, such as the *Chromograph* and "N & G" screens. The principle of all of these kinds is the same, and their purpose, as already explained, is to depress the intensity of the blue, violet, and ultra-violet rays. Considerable differences of opinion exist as to what depth of color is most desirable, but, generally speaking, a lemon-yellow will be found to restrain the over-active rays sufficiently without unduly prolonging the exposure. When using commercial orthochromatic plates it should be remembered that there is a direct relation between the character of the screen and the plate to be used. Thus Cadett & Neall issue "Light Filters," for use with their color-sensitive plates, which they expressly state have no value when used with other plates. Hence it is better to inform one's self, as far as possible, of the opinion of the manufacturer whose plates are used concerning the screens best adapted to his plates.

Among the many dyes used in the preparation of the first kind of screen mentioned, *Aurantia* and *Naphthol Yellow* seem to be especially useful, and a method of making a screen with either of them is here given.

**Aurantia.** Aurantia is an orange-yellow coal-tar dye much used in dyeing leathers. Prepare a solution as follows: Aurantia, 6 grains; warm alcohol, 2 ounces; ether, 2 ounces; soluble cotton (pyroxylin), 40 grains. Dissolve the aurantia in the alcohol, allow to cool, and then add the cotton and the ether. Shake well until dissolved, and carefully filter; now rub a piece of thin plate-glass (good lantern-slide glass will answer) with a thin paste of whiting, water, and ammonia. Allow this paste to dry on the glass and then rub it off with a *clean* cloth—cotton flannel is preferable. The object here is to render the glass absolutely clean. To coat the plate with the dyed collodion, hold it between the thumb and forefinger, pour a pool of the dye solution about the centre of the glass plate, tilt the plate so that the pool gradually spreads toward the finger and thumb holding it (but not to touch them), now tilt the plate so that the solution flows evenly toward the upper left-hand corner, from there to the upper right-hand corner; thence to the lower right-hand corner, where the excess of solution is poured off. If this is carefully done (as a plate is varnished) it will give a thin, even film over the plate. While the solution is running off, gently rock the plate to and fro, gradually bringing it from its horizontal to a vertical position. If it is not rocked, streaks will be formed, fatal to its usefulness, but very slight ridges will disappear in the drying. This screen can be used as it is, but it is better to protect it with a cover of glass, carefully selected and thoroughly clean, with the edges bound as a lantern-slide is bound.

**Naphthol Yellow.** This is a coal-tar dye, not very soluble in water, and yielding a bright yellow solution. A simple method of making a screen with this dye is to thoroughly fix and wash an unexposed lantern-plate and then immerse it in a saturated solution of the dye for a few minutes, after which dry it without letting any dust get upon the dyed film. When dry, protect with a lantern-slide cover-glass, and bind in the usual way as lantern-slides are bound. This is a somewhat rough-and-ready method, but the screen will be found efficient for general use outdoors. The commercial "yellow screen" is generally an aurantia-dyed film sealed between optically plane pieces of glass.

**Brillant Yellow.** Ives says that "brilliant yellow" is more suitable for an all-around screen than "naphthol yellow." A light yellow screen made with the former cuts down or subdues the action of the violet rays chiefly, and its absorption is progressive through the blue and green according to the depth of color of the screen. "Naphthol yellow," on the other hand, absorbs the lower half of the spectrum somewhat abruptly, which is not always desirable. The Ives formula for a "brilliant yellow" screen is as follows: Soluble cotton, 40 grains; ether, 4 ounces; clear saturated solution of "brilliant yellow," 4 ounces. To prepare this solution the cotton is thoroughly soaked in the alcoholic solution before adding the ether. If the cotton does not thoroughly dissolve, or the collodion formed by the mixture is not clear, allow it to stand before using. To make the screen coat this dyed collodion upon thin plate-glass. By adding plain collodion to this dyed collodion the depth of tint of the screen may be varied at will.

**Acridine Yellow.** This dye has been recommended by Dr. E. Vogel as being better adapted for landscape work than aurantia, as it allows the blue-green rays to pass, while aurantia absorbs them. His formula is as follows: Prepare a stock solution A—Acridine yellow, 10 parts; alcohol, 100 parts. To form the dye solution, take of A, 30 parts; collodion (plain), 50 parts; and ether, 20 parts.

**Auramine.** Gray recommends the light yellow variety of this anilin dye as useful, with the advantage that it will not fade, even in sunlight, as many aniline dyes do. To prepare a screen an unexposed but thoroughly fixed and washed lantern plate is immersed for a few minutes in a saturated solution of the dye (previously prepared with hot water, to facilitate solution). If the plate, when dry, shows opalescence, this may be removed by immersing it in a solution of one part acetic acid and twenty-five parts of water.

**Mitchell's Screen.** Dr. Charles L. Mitchell describes an excellent screen, as follows:

Procure plate-glass, thin, perfectly flat, and free from all striæ or bubbles. The thin plate-glass that is frequently used for making color cells and animalculæ tanks for the gas microscope will be found to be excellent for this purpose. After being cut in small squares of the size desired, a square should be flowed on one side with a solution of the coloring agent in amyl-acetate collodion. For the yellow screen an aniline dye, called "golden yellow," may be used in the proportion of five to eight grains of the dye to the fluid ounce of varnish, according to the depth of tint desired. It is permanent, does not fade to any extent, and gives a rich lemon-yellow screen. The amyl-acetate collodion is known in trade by a number of names, such as "enameline," etc. It can be easily prepared on a small scale by cleaning off the emulsion from a spoiled celluloid film, cutting the film up in small strips (soaking them well in strong alcohol to remove the camphor), and placing these in a bottle with a mixture of one part amyl-acetate, one part petroleum benzine, three parts alcohol, and three parts ether, all by measure. The celluloid swells up and dissolves rather slowly, hence the bottle containing the mixture should be well shaken at intervals for several days. When the celluloid is all dissolved, the liquid should be filtered through a little absorbent cotton to remove any loose flecks of dirt, and the dye added. This varnish gives a tough film, clear and free from transverse striæ. The glass square, after having been coated with the colored varnish, is allowed to "set" for a few moments, and then placed aside on a flat surface until the varnish is perfectly hard and dry. Care must be taken to keep it covered while drying, so as to avoid dust and dirt settling on it. The coated plate is now placed on a level surface, film upward, and sufficient pure Canada balsam (white and free from dirt) poured on the plate to make a pool in the middle of the plate of about one-fourth of its area. A fresh, clean glass square of the same size is next taken, and gently lowered on the balsam and plate in the same manner that a cover glass is placed on a microscopic object, and then a gentle and even pressure applied until all air is forced out, and the two glass surfaces are cemented together with the balsam and are in uniform contact. The cemented plates are now laid aside on a flat surface, and allowed to remain several weeks undisturbed, until the balsam has thoroughly hardened. Then the edges are cleaned off, the exuded balsam being removed with a little benzine or benzole, and the edges bound with some strips of lantern-slide paper.

**Screens of Various Depth of Tint.**

The purpose of the yellow screen being to diminish the excessive sensitiveness of the plate to the blue, violet, and ultra-violet rays, it is obvious that as the amount or intensity of these rays to be dealt with varies according to the season, time of day, and the predominance of blue rays in the subject to be photographed, a yellow screen of one depth of tint or intensity is insufficient to cope with these changing conditions. The screen then, as far as its tint-depth is concerned, must be chosen to meet the conditions existing in each individual case. This does not necessarily mean that we will need a large number of screens; three or four will be found amply sufficient for all practical purposes, and these should have regularly increasing or progressive depths of tint or intensity.

The following method of preparing four screens of this sort, increasing in intensity according to their enumeration, and equally so prolonging the necessary exposure in like ratio, is due to the late M. Ed. Boissonnas. The making of these screens will be found to be easier than would appear from the description. Experiment led M. Boissonnas to determine that with what he called

No. 1, or a faint yellow-colored screen, the exposure of the orthochromatic plate, which, without a screen was unit or one, was increased by that screen from 1½ to 3 times, according to the intensity of the light; No. 2, a darker screen, increased it from 3 to 6; No. 3, still darker, from 4 to 9; and No. 4, from 6 to 12. The preparation of the colored film was conducted as follows:

Four sheets of selected glass, each five by seven inches, are coated with a thin film of wax in benzole, applied with a clean linen cloth, dried over the heat of a spirit lamp, and the surface slightly polished. When quite dry, an edging of benzole is given to the plates, which are then coated with a plain collodion containing one drop of glycerine for each two ounces of collodion. Two solutions are then prepared: A, the coloring solution, consisting of white gelatine, 110 grains; glycerine, 15 drops; carbolic acid C. P., 2 drops; distilled water 3¼ ounces; and 1½ fluidrachms of a half per cent. alcoholic solution of aurantia. B, a plain solution, consisting of white gelatine 110 grains; and 15 drops of glycerine in 3½ ounces of distilled water. In each case the gelatine should be dissolved first and the other ingredients added after the thorough solution of the gelatine. The solutions should be well filtered and kept at a temperature of 120° F. during their manipulation. For screen No. 1, of lightest tint, 2½ fluidrachms of solution A are mixed with 1 ounce of solution B, and applied (as a plate is varnished) to one of the already collodionized plates.

Screen No. 2 is prepared by coating a second collodionized plate with a mixture of 5 fluidrachms each of A and B.

Screen No. 3 in like manner is prepared by mixing 1 ounce of A with 2½ fluidrachms of B and coating the third collodionized plate.

Screen No. 4 is prepared by flowing 1¼ ounces of A over the collodion film of the fourth plate.

Thus the depth of color is in the inverse proportion of the dilution of A with B. When the films are perfectly dried, they are each coated with another film of plain collodion and stripped from their supports.

The films of colored gelatine so prepared may be used as ray filters or screens in the diaphragm slot of the lens by securing them in thin cardboard disks fitted to the diaphragm opening, *i.e.*, of the same shape and thickness as a diaphragm; or they can be applied to thin, flatted crystal glass, and used before or behind the lens in the usual way. Similar screens are sold by dealers, but those who care to use a little patience may by this method prepare their own screens at slight cost.

**Liquid Screens.** The second kind of screen mentioned is generally a solution of chromate or bichromate of potassium or ammonium. The construction of a glass cell to hold the solution is a delicate bit of workmanship for the average man to attempt, hence I give no information touching this detail. Such cells can be obtained commercially, and as a single cell may be used for different solutions at will, provision being made for emptying and refilling, it will be found more economical and more satisfactory to purchase rather than to make one for one's self.

The ideal *Ray Filter* should not only be transparent to the rays which are to be used in making the picture, but should be so accurately constructed as to cause no deflection of the light rays entering the lens. The Bausch & Lomb bichromate of potash *Ray Filter*, consists of two thin pieces of optical glass, the surfaces of which have been ground and polished perfectly plane and parallel. Between these plates is cemented a glass ring of uniform thickness throughout, forming a cell of proper depth in which is contained the bichromate of potash solution. This is almost perfectly transparent to green, orange, yellow, and red rays, but absorbs the other rays partly or completely, according to the strength of the solution.

The glass part is mounted in a neat metal ring which protects it and holds the filter firmly in the proper position upon the *front of the lens*. Obviously, the filter should not be placed at the diaphragm of the lens, as any refraction caused by it would be greatly magnified in the image; nor at the back of the lens, being in that position inaccessible if it is desired to make a quick change for instantaneous work, etc.

With regard to the strength of the solution used as a filter I find the "standard solution" sent out with the *Ray Filter* a little too deep in color for general purposes. Its strength, as far as can be judged by comparison, is 3 parts of bichromate to 100 parts water. Experience would indicate that a 1 per cent. solution for average landscape work, and 1–200 or 1–250 for autumn foliage and similar work would be sufficient for all practical purposes. There is a good deal of difference of opinion in this matter, and personal experiment is probably the best way to settle the question for one's self. Of course, the deeper the color of the solution, the more decided will the effect be; it is, in fact, quite easy to use a solution of such depth that the blue rays are overmuch depressed, and the yellows are falsely rendered. Messrs. Cadett & Neall, for their *Spectrum* plate, recommend a ten per cent. solution of chromate of potassium in a cell one-eighth inch thick.

**Colored Glass Screens.** Of screens made of colored glass I am not able to speak from experience. They are used more by European than American workers, and the chief difficulty seems to be to secure glass of uniform color-depth throughout, free from defect. By careful examination of pieces at stores trading in colored glass, however, it may be possible to find a small piece suitable for the purpose. The Manhattan Optical Co.'s *Chromograph* is, I believe, a screen of this kind, very convenient in form, and supplied with two differently tinted glasses with optically worked surfaces and interchangeable in the mount. The *Burchett* and *Lumière* screens are of this class.

**Other Screens.** Waterhouse recommends screens of talc or mica, coated with a cold crystal varnish of benzole and sandarac dyed with annatto or turmeric.

For reproduction work, photo-micrography, and other special applications of orthochromatic photography different ray filters are used according to the purpose in view. Thus screens may be made with dyes which will "cut out" or absorb all the spectrum rays except the one needed, as, for instance, in three-color reproduction work where three negatives are required giving all the red, blue, and yellow rays respectively coming from the object reproduced.

It is interesting to note that the use of a bichromate cell as a ray filter was first pointed out by Mr. F. E. Ives, who also claims the credit of having first produced dyed screens sealed in optical contact, and the selection by photo-spectroscopic tests of dyes effectually preventing the action of the invisible ultra-violet rays on the photographic plate.

**Shape and Position of Screen.** As the object of the screen is simply to prevent some of the light rays from reaching the plate, it does not matter whether it is placed directly before or behind the lens, or between the elements of the lens if it is a doublet. (In the latter case, it should be very thin, and occupy the place of the diaphragm). Neither does it matter whether it be round or rectangular, so long as it is large enough to embrace the widest angle formed by the rays passed by the lens.

When the back of the lens-board is easily accessible a rectangular screen, made as described under *Aurantia* is very convenient, inexpensive, and easily replaced if broken. To fix the screen for use two corners can be held by small staples driven into the board, *d*, *d*, *d*, *d*, the other two corners are held by two buttons as shown in Fig. 6. *a*, *a* are the staples, *b*, *b* the buttons, and *c* is a section view of one of the buttons. To remove the screen the buttons are turned to one side and the screen is slipped out from under the staples. Another plan is seen in Fig. 7 in which we make use of the frame to which the bellows of the camera is attached. In this case the screen must be made to fit easily within the frame. It is kept from falling backward by three quadrants of thin wood or cardboard glued in from the back, as shown in sketch. The fourth corner of the frame is left without a quadrant, so that by pressing that corner of the screen backward, the opposite corner (A) is brought forward *i.e.*, outward, when we desire to remove the screen. The quadrants are marked B. The lens board prevents the screen from falling out in front. Carbutt

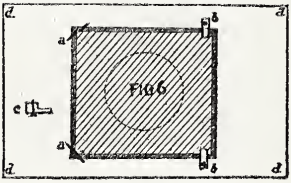
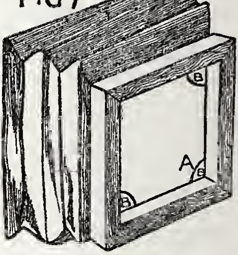


FIG 7



A GRAY AFTERNOON. Wm. Thomas

*Copyright*, 1899, *by R. F. Turnbull, N. Y.*

RAIN SQUALL ON THE HUDSON. R. F. Turnbull

YOSEMITE. Oliver Lippincott

SWEET WILLIAM. Hy. Troth

recommends placing the screen between grooved pieces of wood at the back of the lens board, with a third grooved strip at the bottom for the screen to rest upon.

As a makeshift the screen can be fastened to the inside of the camera front (behind the lens) with strips of gummed paper. When the lens barrel projects beyond the front board into the camera, a thick piece of cork with a circular opening to fit on to the lens barrel at one side, and a square or rectangular bed at the other side into which the screen is fitted, will be found to answer the purpose.

Liquid screens, such as the Bausch & Lomb *Ray Filter*, are generally fitted to the front of the lens tube by means of a flange. Lumière's screens are made to go between the lenses, behind the diaphragm; Edwards' screens may be had in the form of a diaphragm, or to fit in the front hood of the lens. When it is desirable to use the screen in front of the lens, it should be made circular and fitted to a band like the ordinary lens-cap. When collodion film screens are mounted to the ordinary Waterhouse diaphragm, this latter should be countersunk for about a quarter of an inch all round the aperture, and the film mounted within this space with gelatine, so that it is flush with the diaphragm surface. This countersinking of the diaphragm will protect the film from damage during its insertion or withdrawal from the lens.

**Focusing.** The question is sometimes asked: is it necessary to focus with the screen? or, has the insertion of the screen after focusing any influence on the focus of the image? Practically, for outdoor work and other ordinary branches, the insertion of the screen after focusing causes so small a difference of the focus that we may please ourselves in the matter. It is better, however, to focus with the screen where fine definition is desired, as for instance, in copying documents or reproduction work. The difference of focus caused by the screen is carefully stated in the subjoined extract from *Process Work*.

There seems to be some misconception with regard to using color filters in conjunction with the lens, some operators having got the idea that the focus ought to remain the same with and without the filter. This can never be so, however good the lens may be and however perfectly the filter may be worked in optical planeness and parallelism. The laws of optics tell us that the index of refraction from air to glass is $\frac{3}{2}$ and from air to water $\frac{4}{3}$. This implies that if the filter is a piece of plane glass, or two glasses cemented together and placed anywhere in the path between the original and the plate, the focal distance will be shortened by one-third the thickness of the glass or glasses. It does not matter whether the filter is placed immediately in front of the copy, in front of the lens, behind the lens, or immediately in front of the plate; the result must be the same, viz., that if the lens has been focused without the filter in position the focus will have been shortened by one-third the thickness of the filter when the latter is inserted. The case is somewhat more complicated when the filter is a cell filled with colored liquid, because we have not only to take into account the thickness of the glasses, but the thickness of the layer of water and the different index of refraction which water possesses. As the index is $\frac{4}{3}$ it is obvious that the focal distance will be shortened by one-fourth the thickness of the layer of water. Therefore we can say that the shortening of focus in case of a cell filled with water will be one-third the thickness of the two glasses plus one-fourth the thickness of the layer of water. Let us take an example:

Glasses of cell together = $\frac{3}{16}$ inch thickness.
Layer of water ....... = $\frac{1}{4}$ "
$\frac{1}{3}$ of $\frac{3}{16} = \frac{1}{16}$
$\frac{1}{4}$ of $\frac{1}{4} = \frac{1}{16}$
$\therefore$ Focus is shortened $\frac{1}{8}$ inch.

If the cell is filled with some other liquid than water the refraction would be greater. Alcohol comes next to water, but the difference in its refractive properties is so slight that it may be taken for all practical purposes the same as water.

**Exposure.** We now come to the exposure of orthochromatic plates and, as usual, it is difficult to give any definite instruction about it, except to say that the idea that orthochromatic plates are necessarily slower than ordinary plates is erroneous. It is true that some commercial orthochromatic plates are slower than the most rapid ordinary brand of the same maker, and it is true that the dyes used to impart special sensitiveness to certain rays depress the general sensitiveness of the plate. But these things can be overcome by improvements in manufacture, and so we have orthochromatic plates which, *if used without a screen*, are as rapid as any ordinary plate made. It happens, however, that orthochromatic plates exhibit the peculiar effects of underexposure in a more decided manner than ordinary plates, and we are always advised to give them full exposures, and, as a general thing, we must use a screen of some kind to get full orthochromatic effect with the most rapid plates. Hence, they are generally thought to be less rapid than ordinary brands. The essential thing to remember is that orthochromatic plates can be had sufficiently rapid for all except the most difficult class of movement photography, and that their reputed slowness arises from the use of the screen.

When used *without a screen*, the orthochromatic plate may be exposed according to the factors generally governing ordinary plates of the same class—with these exceptions (1) that if the subject shows a preponderance of yellow, yellow-green, and red, the exposure should be less than for a preponderance of blue or gray, and (2), that if the light is yellowish, as at sundown, the exposure may be less than would be given for an ordinary plate of the same class or speed. A full exposure always gives better results, for reasons already stated. Experience is the best judge in these details, but the exposure of a few orthochromatic and ordinary plates of the same class, side by side on the same subject, with Todd's *Exposure Tables* will enable the reader to gauge the possibilities more quickly than random exposures.

Here I may say that the photographs reproduced in Plate II. were made with Cramer's *Crown* and *Instantaneous Isochromatic* plates, without a screen, the subject being screened by yellow fabric placed near the sidelight to subdue the light on dress, and the exposures, equal in all cases, were *three* seconds. This shows that the orthochromatic plate is rapid enough for all ordinary portrait work.

When a screen is used, the depth of color of the screen must be taken into account in addition to the usual factors. If the reader uses one screen, or several, he must ascertain by actual test (say on an open landscape at noon in summer) in what proportion each screen increases the exposure required without a screen. This will enable him to mark his screens with numbers corresponding to the amount of increase required in exposure. Makers of orthochromatic plates usually inform those who use their plates and screens just how much increase is needed when their plates are used with this or that screen. Any record of actual experience with plates and screens generally known is here of such obvious value that I risk being accused of opening these pages to advertisements to make room for the following table and other similar data :

### Table of Comparative Exposures

required for Cramer *Crown*, *Instantaneous Isochromatic* and *Slow Isochromatic* plates, for landscape work with and without Bausch & Lomb's *Ray Filter* and standard solution.

| Plate. | Ray Filter. | *f*/8 | *f*/11 | *f*/16 | *f*/22 | *f*/32 | *f*/45 | *f*/64 |
|---|---|---|---|---|---|---|---|---|
| | | Sec. | Sec. | Sec. | Sec. | Sec. | Sec. | Sec. |
| Crown.... | No.. | 1-32 | 1-16 | 1-8 | 1-4 | 1-2 | 1 | 2 |
| Crown.... | Yes. | 8 | 16 | 32 | 64 | 128 | 256 | 512 |
| Inst. Iso.. | No.. | 1-16 | 1-8 | 1-4 | 1-2 | 1 | 2 | 4 |
| Inst. Iso.. | Yes. | 3-16 | 3-8 | 3-4 | 1 1-2 | 3 | 6 | 12 |
| Slow Iso.. | No.. | 1-2 | 1 | 2 | 4 | 8 | 16 | 32 |
| Slow Iso.. | Yes. | 1 1-2 | 3 | 6 | 12 | 24 | 48 | 96 |

Note.—In columns headed F. 8, F. 11, etc., are given opposite each plate the number of seconds exposure required for each of the various stops usually supplied with ordinary rectilinear lenses. Should the exposure required for the Crown Plate without Ray Filter be greater or less than two seconds with smallest stop (F. 64) all other exposures must be increased or decreased proportionately. Prepared by William M. Butler, 2686 Osage Street, St. Louis, Mo., November 8, 1898.—Reprinted by permission from Cramer's *Manual*.

The *Carbutt* screen multiplies the normal exposure for an outdoor scene from four to six times ; the "Standard Solution" of the *Ray Filter* about three times, as shown in *Cramer's Table ;* this applies also to the Edwards' screen. Cadett & Neall issue special "light filters" for their own plates, "of no value with any other plate ;" increasing the exposure from twenty to forty times, but it must be remembered that these "*Spectrum*" plates are exceedingly rapid, and this apparently enormous increase still permits of instantaneous exposures in a good light. In fact, it may be said that, as a general thing, the increased exposure demanded by the use of the ordinary screen does not interfere with the possibilities of photography as generally understood. Our plates are now so rapid that, in almost all branches of work, the increasing of the exposure three or four times does not preclude the attempting of any work which can be done with the ordinary plate.

When using a yellow screen in conjunction with a Watkins or Wynne exposure meter, it may be held over the meter when testing the light if preferred and time permits. There will then be no need to multiply the exposure by two, five, or seven, according to the depth of tint of the particular screen, and the actinometer will give the correct exposure at once.

**Instantaneous Exposures.**

We approach a very interesting question in orthochromatic photography when we ask: Can we use orthochromatic plates for instantaneous work? This is generally answered in the negative, even by manufacturers of orthochromatic plates. As a matter of common sense it is evident that for many branches of instantaneous photography there is little or no advantage to be gained by using a plate sensitized for other light rays than the blue rays which are usually predominant when instantaneous work is attempted, and this especially applies to orthochromatic plates used with a yellow screen. However, there are times when it may be desirable to attempt instantaneous work, even with a yellow screen in conjunction with an orthochromatic plate, as, for instance, in hand-camera work, and so I make room for a note by Captain Abney touching this point. He says:

"There are certain orthochromatic plates in the market which are as rapid or more rapid than the large majority of ordinary rapid plates. If we take such a plate and expose it in a hand camera with a stop f/16 on a fairly light day, for the one-sixtieth of a second, we shall find that it gives a picture in which details are shown which would not be if it were underexposed. Now if we combine with the lens a piece of orange glass, which cuts off a large amount of the blue, we shall find that it takes about twelve times the exposure to get proper detail. In other words, with a hand camera, and day such as we are supposing, we must expose for one-fifth of a second, a period by no means impossible, but plenty long enough to make sharpness of image very doubtful, unless certain precautions are taken to secure stability. Suppose we have a lens which works with an aperture f/5.6,, the light admitted to the plate is really eight times that admitted with f/16, and by using this large aperture we need only increase the exposure to the one-fortieth of a second, always supposing that the relative efficiencies of the shutter were the same with the two apertures. Now, as a matter of fact, we know that such is not the case, the efficiency is always less, that is, the time during which the whole aperture is uncovered is always less with a large stop than with a small one, and, probably, in most cases, the total exposure given would have to be increased to the one-twenty-fifth of a second. But this is amply long enough to secure freedom from blurring of the image through shaking. We may, therefore, in good light evidently secure pictures through yellow glass in a hand camera. Some experiments made by the writer show that the relative effects on the plate by yellow and blue rays are not quite the same—that is to say, with very feeble light, such as is to be found in the shadows of a picture, the power of impressing the plate is slightly less with the yellow rays than it is with the blue. The gradation shown on a plate will be steeper in the one case than it is in the other, and thus a negative taken through yellow glass will appear to have more pluck than it would show were this medium dispensed with. With such a plate and such a lens, then, it is quite possible to obtain orthochromatic effects with an instantaneous exposure. The writer has been employing a lens of 5in. focus which gave a really sharp image over a quarter-plate with an aperture f/5.6, and a plate which is well colour-sensitive. With these he is able to get well-exposed images at this season (May) up till about five o'clock with a shutter working in the one-twenty-fifth of a second, using a yellow glass, which required only ten times the exposure given to the plate when no screen was employed. The lens in question was unsuitable for placing the screen at the diaphragm—in fact, owing to the largeness of the diaphragm used, it would have been very little gain if one could—and it was placed in some cases behind the lens, and in others in front of it."

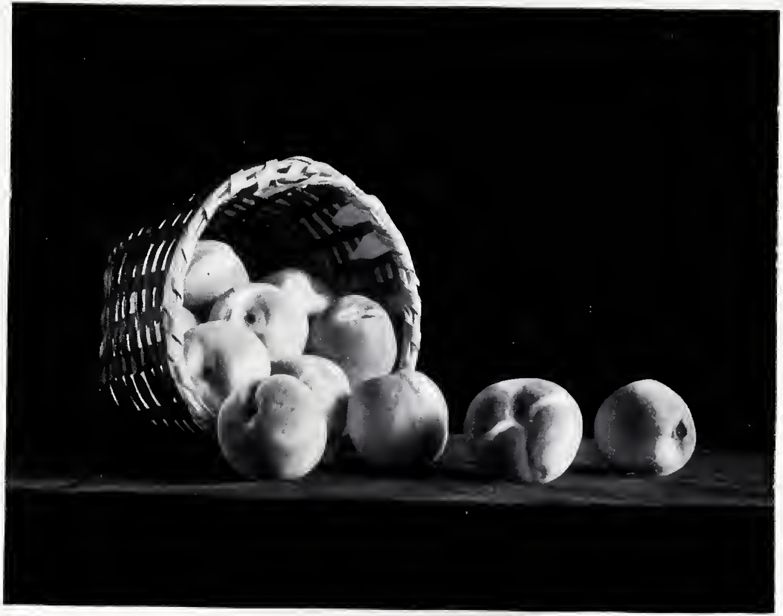
It should not be forgotten that Captain Abney, in these remarks, deals with the conditions of illumination existing in England. In this country it will, of course, be possible to use a hand camera and yellow screen with orthochromatic plates and even shorter exposures than he mentions. Thus, my experience with *Cramer's Inst. Isochromatic* plates and a *Carbutt* light-yellow screen shows that, in photographing an open landscape in spring or autumn, one-fifth second exposure with the lens at f/22.6 is generally ample. One-fifth of a second at f/22.6 would mean one-fortieth of a second with a lens working at f/7.7. For exposures at the seashore, or open landscape at noon in June, these exposures could be still further shortened without fear of underexposure. The *Table of Comparative Exposures* with plain and isochromatic plates given elsewhere will also be found of interest in considering the influence of the screen upon exposure, although I consider the exposures there given for the *Instantaneous Isochromatic* plates much longer than is actually required on a bright day.

**When to Use a Screen.** Perhaps the greatest drawback in orthochromatic photography is the supposed necessity of using a screen in order to secure the desired effect. Now, *it is true that, in order to render correctly the luminosity of objects our plate must be sensitive to the light rays reaching it in proportion to their luminosity*, but that is *perfect* orthochromatism, which (1) has not yet been attained and (2) may not always be necessary or desirable. Let us, therefore, inquire as to when we should use a screen, and when we may dispense with it, contenting ourselves with something less than perfection of luminosity representation. We know the function of the screen—to depress or subdue the over-active blue rays; we know that the screen need not necessarily prevent us attempting even instantaneous work, though it increases the normal exposure from three to forty times. When can we do without it altogether?

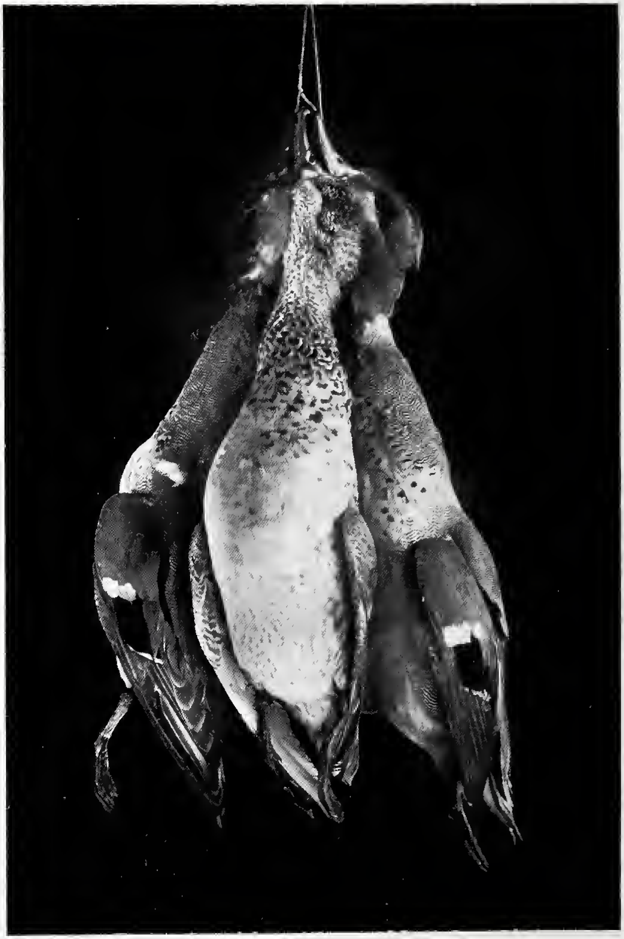
**Landscapes.** The point is one about which there is considerable difference of opinion. Captain Abney says that the screen is not necessary or desirable when photographing an outdoor scene with plenty of sunlight from a high sun, the sky being comparatively free from clouds, and the atmosphere clear. He continues:

If we take a negative of a landscape on a cloudy day, the lighting is of uniform quality, and screen or no screen will not matter. The results will be very closely identical. When we come to a sunset, however, we have different conditions. The high lights are illuminated by the sun and the sky. Now in the orange light of a sunset there is very little blue light, and, as is well known, the most brilliant illumination of a setting sun fails to show itself on a plate without a screen on this account. Practically all the photographically actinic light is high light and shadow is sky light. Place a yellow screen in front of the lens, however, and the whole aspect is changed. Considering the sunlight as all yellow, we get on an unscreened plate, a ratio of high light and shadow of five to half, or ten to one, with the yellow screen inserted it is seventy to one. The effect of sunlight would therefore, be shown in the last case, but not in the first. It must not be assumed that the above proportions of yellow to blue represent the facts entirely, but they are sufficient to argue upon. Any of these legitimate factors would lead to the same results. If we want cloud effects the use of the yellow screen at all times is useful, for whilst from the clouds it allows the yellow contained in the sunlight to pass, it only leaves a small amount in the blue sky. The consequence is that the white cloud will be much better delineated when the screen is used than without it. When we have a blue distance the yellow screen is a very useful adjunct to ensure its absence.

Ch. Ehrman says : When the sun is low, or the light of a yellow color—a screen will not only be useless, but absolutely disadvantageous. The light itself acts as the screen, dispensing with its use in the same manner as in copying oil paintings by a yellow light, where a screen is also dispensed with. It is obvious, therefore, that the use of a screen in photographing landscapes must be left to the judgment of the photographer. It may be said, however, that it is very rarely necessary, and in almost every case an orthochromatic plate used alone will, by its increased sensibility to yellow or red, give a far better effect and a more truthful color rendering than an ordinary plate ; and this, of course, is more and more apparent the larger the amount of yellow that is included in the picture. Thus, for instance, the effect is most apparent in photographing a woodland scene in autumn when the leaves are turning yellow, and in this state of affairs a screen is absolutely unnecessary. Indeed, its only effect would be to increase the exposure necessary. As we said before, the only occasion for the use of a color screen in landscape photography is when



PEACHES. W. J. Cassard



DUCKS. W. J. Cassard

the violet and blue rays have so pronounced an action upon the sensitive film that their representation in monochrome is out of all proportion to the effect of the color value as apparent to the eye. When used for landscape work the color of the screen should be of a very pale yellow. If too strong, it is liable to give an exaggerated effect; that is to say, the distant parts of a landscape would appear too sharply defined; they would lose all effect of distance imparted to them by the mistiness that lends aërial perspective to the view.

G. T. Harris says: When the photographer is compelled to work in dull weather, with overcast sky, the use of yellow filters aids enormously in getting results superior to those obtainable with ordinary plates. The greens are brightened up, and the distance rendered clearer to such an extent that a landscape photographed with a deep filter under a dull, heavy atmosphere will often have the appearance of having been taken in a good diffused light. This fact alone should make the use of orthochromatic plates and light-filters commendable to the professional photographer, who, indeed, seems the most persistent in ignoring their aid. Another direction in which filters, and notably deep ones, become extremely valuable in the work of the professional photographer, is in photographing buildings in large towns, where smoke, haze, and congested thoroughfares make it almost impossible to obtain good results when working in the ordinary manner. The shadows are covered with gray haze, and the exposure has not been quick enough to avoid movement in the traffic, nor sufficiently prolonged to obliterate it altogether. But, use an orthochromatic plate and a deep enough filter to clear away the haze, the long exposure necessary under these conditions quite obliterates the effects of the traffic, and the result is a photograph with clear shadows and an absence of blurred figures in the foreground.

John Carbutt says: For landscapes no color screen is required, except in case of distant mountains relieved against a blue sky, or to obtain cloud negatives, then a very pale yellow color screen may be used, but it must be understood that when a color screen is used, the exposure must be increased from four to six times, depending on the state of the atmosphere; the yellower the light the shorter the exposure, and toward evening the screen may be dispensed with; the value of a light-yellow screen is best shown where the vista is slightly hazy, or where clouds are included in the view. Their outlines and forms will be much better rendered in the negative with a screen than without one.

**Portraiture.** In portraiture with orthochromatic plates it is usual to dispense with the screen except under exceptionable circircumstances, such as costumes with brilliant color, uniforms, and similar subjects. In ordinary portraiture it will be sufficient to screen the sidelight, and perhaps a portion of the skylight, with bright yellow fabric placed at some distance from the glass, so that the subject is bathed in bright yellow light. These yellow curtains should be arranged in such a way that the head and face of the sitter are illuminated by white light, save when yellow hair and highly colored or freckled complexions are to be dealt with. In portraiture with magnesium light or electric light this yellow fabric interposed between the subject and the source of light will materially help toward a correct rendering of costumes, or, if the light is abundant a light-yellow screen may be used with the lens. The depth or intensity of the yellow screen or light employed in portraiture must be gauged by (1) the estimated capacity of the subject, or pose permitting of a short or long exposure ; (2) The total amount of illumination, and (3) the rapidity of the lens. Schirm, of Berlin, used orthochromatic plates, sensitized with eosin, for photographing festival groups in costume, using the magnesium light. The plates were screened with a yellow screen and the series (taken 1890) of two hundred and eighteen groups were remarkable for their general as well as orthochromatic quality. It is curious that photographers have been so long in finding out the very obvious advantages of orthochromatic plates in portraiture, especially when we recall the fact that there are no difficulties connected with the use of plates or screens which are not easily overcome by intelligent manipulation. Their use in portrait work, however, is steadily increasing, and there is a studio to-day in New York, conspicuous as much for the variety as for the excellence of its work, where isochromatic plates are used exclusively. This is as it should be.

**Clouds.** Here the use of the screen is essential because of the delicacy of the luminous values of white clouds and blue sky.

In landscapes with clouds, the light-yellow screen may be used; where clouds alone are photographed a deeper tint, such as the Boissonnas screen No. 2, will be advantageous, and a slow rather than a rapid orthochromatic plate is to be preferred. In this case an exposure of from one-tenth to one-quarter of a second will be about right. Of course, it will be readily understood that with lenses of large aperture, such as the anastigmats, we can use a rapid orthochromatic plate and a yellow screen fairly full in tint, without a much longer exposure than would be required with a lens working at *f*/8 and a slow orthochromatic plate with light screen or no screen at all. Where this can be taken advantage of the rendering of luminosity values will necessarily be better. With regard to the different cloud forms, some being strongly defined and others having more delicate values, it is obvious that a screen of deeper tint is required for the latter, while a light screen will suffice for heavier forms.

**Flowers, Fruit.**

That orthochromatic plates are essential to success in photographing flowers or fruit is unquestionable; whether the yellow screen is always desirable may be debated. Much depends upon the color luminosities of the subject. If there are strong contrasts, *i.e.*, flowers showing brilliant color and others of little or no luminosity, the screen is essential, and a slow plate will be advantageous. When it is a question simply of yellows and greens, having almost equal luminosity, the slow plate without the screen will be sufficient, as the use of a screen of deep tint would represent the luminosities of the colors in too high a tone. The same applies to the reproduction of colored fabrics, draperies and decorated pottery of all kinds. When we have to deal with reds and full orange colors, the use of a plate specially sensitized for these portions of the spectrum (such as the *Erythro* plate) is indicated, with a screen to hold back the blues which may be present in the subject. The background used in this class of work should also be carefully considered, as the relative luminosity of colors is largely influenced by the ground against which they are seen. The photography of flowers and fruit is, however, a big subject, and will be fully dealt with in a future number of THE PHOTO-MINIATURE.

**Marines and Sea-shore Views.** For photography on an ocean trip, seascapes, and work along shore, the advantages of orthochromatic over ordinary plates are self-evident. Here also, there is no question as to the necessity of a screen, because of the preponderance of the blue rays and intensity of illumination, together with the most delicate luminosity values. When the subject does not include movement, as in views along shore or harbor scenes, a slow plate and medium screen will give the best results. Where movement is a factor to be considered a rapid plate and light screen should be used. As a general rule, however, the medium screen will be found most useful. The question of exposure need not be dealt with as a difficulty in this class of work, inasmuch as there is almost invariably a surplus of illumination. In instantaneous work, of course, it would be folly to use a screen too deep in tint, and here we must compromise in order to secure movement without the blur which will result from an exposure of more than, say, one-thirtieth of a second. A word should be added here about the keeping qualities of orthochromatic plates where subject to salt air influences—whether on an ocean trip or at the shore. It has been my experience that, under these influences, orthochromatic plates rapidly lose their general sensitiveness and show a predilection to fog, streak, and exhibit general depravity in development. These vagaries I ascribe to carelessness in storing the plates, leaving them in the holders for some time before exposure, or between exposure and development. Too much care cannot be exercised in these details. The plates should be stored on edge (not laid flat), and in a cool *dry* place. If a considerable quantity of plates is taken on a trip they should preferably be packed in air-tight boxes, or each separate box should be packed in paraffine paper or tinfoil to prevent access of salt air. The holders should be filled as near the time for their use as is possible, and wrapped in thin rubber-cloth after use until the plates are developed. Development should follow exposure as quickly as is convenient. In other words, the plates must be protected in every possible way from the all-pervading damp salt air.

**Paintings of all Kinds.** In the reproduction of paintings in oils or water-colors, and colored designs of every kind, orthochromatic plates and a screen or screens are absolutely necessary. It is sometimes said that the screen is not an absolute necessity, provided that the subject be illuminated by light rich in yellow rays, such as lamplight. In this case the light itself acts as a sort of screen, but a proper screen or ray filter will, even here, be a decided gain. The choice of a screen must be determined by an examination, under the illumination to be used, of the subject viewed through two or three screens of different depths of luminosity. For modern paintings, of brilliant and light hues, a medium screen is most useful. For old paintings, or designs sombre in hue, a deep screen and consequently long exposure will give the best results. Another method is to use diffused daylight, working by a window obscured by yellow fabric or paper, so that the subject is bathed in yellow light. For amateurs gaslight or lamplight form efficient and convenient illuminants, permitting the work to be done in the evening; in the reproduction of old paintings direct sunlight should be used if possible. Where we have to deal with brilliant reds or orange-reds in the subject, a plate specially sensitized for these portions of the spectrum will be necessary, such as the *Erythro* plate, Lumière's *Panchromatic*, *Lightning Spectrum*, or a *Carbutt* orthrochromatic plate (slow variety) resensitized in a cyanine bath as follows. Make a solution of one-third grain of cyanine in 1 ounce deodorized 95 per cent. alcohol. Flow the plate with this and dry in darkness, then immerse in clear water two or three minutes and again dry in darkness. Whatever source of light is used care must be taken to avoid reflections and shadows cast by irregularity of surface in the original.

The predominating tone and character of the subject, is perhaps the most influential factor in determining the length of the exposure; thus we may have two oil paintings, one an old master, as Murillo, and the other by some living artist such as Alma Tadema or Sargent, and the old master will require under the same conditions at least three times the exposure required for the example of the living school, because the colors of the latter are so much more intense and luminous, those of the old masters being toned down by time and atmospheric influences to warm, rich shades of brown and yellow, and again there is no doubt that many of the old masters used less brilliant and luminous colors than the artists of the present day. Thus in oil-paintings, old masters will require longer exposures, those of the modern school not so long.

Water-colors are much more luminous, reflecting more white and more colored light than oil-paintings, and therefore require considerably less exposure under practically the same conditions. Pastel or chalk drawings require still less exposure proportionately, and finally, illuminated addresses, where the ground-work is white or pale-tinted paper or parchment, require still less. Frescoes are intermediate between oil and water-color paintings.

**Fabrics.** When is is desired to photograph such colored objects as silk, woollen, or cotton fabrics, we have a few other factors to consider. As we have seen, the color of objects is due to absorption, so is this also the case with silk, wool, and cotton. Now, in the case of silk fibres, much more white light is reflected than from the wool, and the colors from silk are much richer and more luminous because of the extra amount of white light with which they are mixed. With cotton fibre there is still more white light reflected, and the poor transparency of the cotton fibres makes the color seem poor and tame. Therefore we may consider that woollen fabrics require the most exposure, then silk, and then cotton. In the case of material such as carpets, chenille, and velvets, where practically the ends of the fibres are presented to the incident light, there is little or no white light reflected from their surfaces, and therefore they require proportionately longer exposures than material in which the fibres are presented lengthwise or sideways to the eye; here, again, too, silk-velvet requires a longer exposure than cotton-velvet, or velveteen, and the difference is greater the older the materials are.

**Interiors.** For many house interiors without pronounced decoration orthochromatic plates do not offer extraordinary advantages, although color-sensitive plates will always give a more correct record of what the eye sees than the ordinary plate. Where there is woodwork of different tints, or any definite scheme of harmonious decoration, the orthochromatic plate is altogether desirable, and a light screen will add to the effectiveness of the result. Where windows are included in the view, the plate should be backed, although it is sometimes claimed (and the claim is substantiated in practice with certain limits) that halation is largely obviated when color-sensitive plates and a screen are used.

**In the Dark Room.** It is evident, from what we now know about orthochromatic photography, that we must slightly modify our dark-room practice. We cannot, for instance, indulge in the abundance of yellow or red light allowed by the imperfect sensitiveness of the ordinary dry plate. Nor can we experiment so rashly with new developers as they come along, because our plates are of somewhat more complex constitution than we have hitherto used. In other words, the orthochromatic plate does not possess as much latitude in manipulation as an ordinary plate, and so requires a little more care in handling. This little extra care is due to the greater range of sensitiveness possessed by the plate and is amply compensated for by the improved results obtained from its use. The intelligent worker will, therefore, make no complaint over the little additional thought demanded in using orthochromatic plates, but, instead, will welcome the new power they put into his hands.

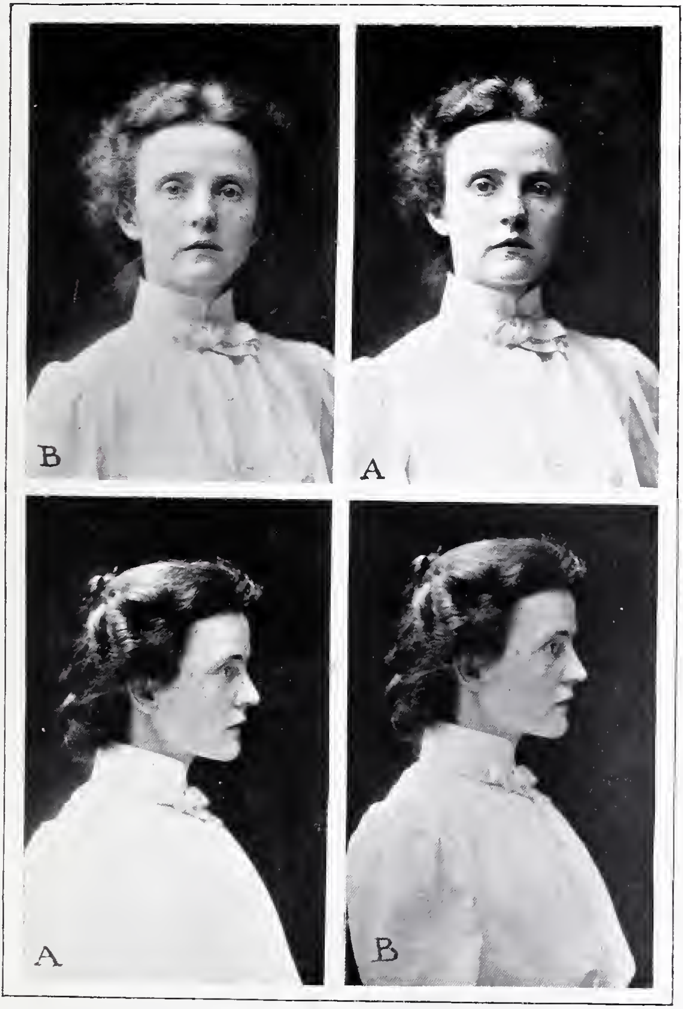
**"Safe Lights."** With regard to the light used in the dark room, except with one or two brands of commercial plates, and plates sensitized for the red rays, a deep ruby light, covered with one thickness of orange tissue-paper, will be found "safe." As far as possible the plates should be unpacked and placed in the holders or in the developing tray, shaded by the body or out of close contact with the source of illumination. In development, when the solution has been applied to the plate, the tray should be covered with a piece of black card or other cover, so that it is developed in darkness. It may be examined, as usual, when development is well begun, but the habit of looking through the plate close up to the light must be avoided. These precautions are necessary in order to avoid fog or veiling. In the manipulation of red sensitive plates, glass of a deep chromium green, combined with a film stained with aurantia, has been recommended; but where red and green sensitiveness are coexistent in the plate (as results from the use of the eosin-cyanide bath), we cannot use such a light as that given by this glass. The only really "safe light" for such a plate is one made by taking two stale, unexposed plates of the desired size, fix them without development, and wash. Now soak one of them in aurantia solution until deeply dyed. Treat the other plate similarly with naphthol yellow; when dry, flow this plate over (on the film side) with collodion stained deeply with methyl violet 6B, and, when dry, bind the two plates together for use in the dark-room lantern.

**Developers.** The development of orthochromatic plates does not present any unusual difficulties; once the handling of the "safe light" is understood, they may be treated as ordinary plates are treated. A point to remember is that although over-development is preferable to under-development, color sensitive plates are liable to quickly gain too much density and become hard. Another point worthy of mention is that two or three drops of a ten per cent. solution of potassium bromide should be added (almost invariably) to every five ounces of pyro solution just before use, where this developer is used.

Pyro is very generally used as a developer for color sensitive plates, and if properly handled, *i.e.*, with judgment, will give results equal to any other agent. When using this developer it is claimed that the orthochromatic effect is gained at the latter part of development, and that care should, therefore, be taken not to stop development too soon (Vogel). The same applies to hydroquinone, according to E. Sanger Shepherd, and he therefore advises the use of metol as an agent which rapidly gets the detail out and so allows of control of density by simply varying the time of development. Carbutt and Edwards recommend pyro, and eikonogen with hydroquinone.

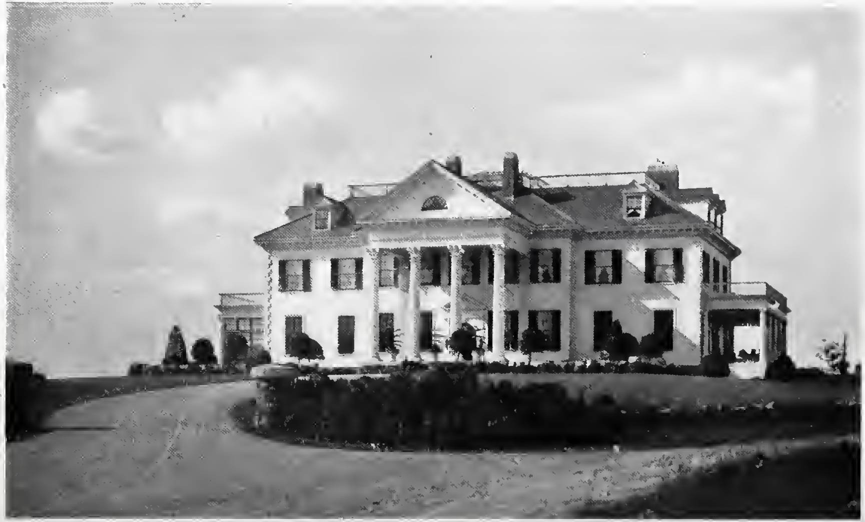
Dr. L. A. Weigel permits me to give a formula which has given him complete satisfaction with various makes of commercial plates and which, as far as I have used it, has given me somewhat clearer negatives than pyro. It is also more convenient in make-up for the amateur. Make the following *stock solutions:* A. Boiling water, 8 ounces; sodium sulphite, ½ ounce; citric acid, 12 grains; para-amidophenol, 40 grains. When this is cool add 16 grains of hydroquinone. B. Water, 16 ounces; potassium ferrocyanide (*yellow* prussiate of potash), 1 ounce; potassium carbonate, 1 ounce. For use with normal exposures, take of A, 1 ounce; of B, 1 ounce;

PLATE E.



*An example of the advantages of color-sensitive plates in portraiture. The portraits marked* A *were made on plain gelatino-bromide plates, those marked* B *on Isochromatic plates. All the exposures were of equal length and the plates of equal rapidity. The subject had warm red hair, and wore a pale blue blouse. From photographs by The Gilbert Studio* (*A. F. Bradley & Co.*), *New York.*

PLATE II



*An example of the advantages of color-sensitive plates in outdoor work; white house against blue sky and fleecy clouds, all secured in single exposure. From a photograph by The Gilbert Studio (A. F. Bradley & Co.), New York.*

and dilute with 8 ounces of water. A solution of bromide of potassium 10 per cent. should be kept handy to restrain development in case of over-exposure.

Ives prefers *tolidol* for his color reproduction work as being better than metol and other modern agents.

**After Manipulation.** Fixing, intensification, or reducing are proceeded with as in the case of ordinary plates. Personally I prefer an acid fixing bath made after Carbutt's formulæ on account of its property of clearing the negative and hardening it. For intensification I use the single solution platinum intensifier introduced by Willis and Clements in the case of pyro-developed negatives; for those developed with the more modern developers such as metol, eikonogen I have lately used the A G F A single solution with success.

**Keeping Qualities.** Nothing has been said about the general keeping qualities of orthrochromatic plates because the old theory that they were different in this respect from ordinary plates has long been exploded. The common sense of the matter is that they are more complex and more perfect in their chemical constitution than ordinary plates, and so are more sensitive to atmospheric changes, extremes of heat and cold, damp salt air, foul air and the like. It is probable, also, that in common with other kinds of supersensitive plates, they more rapidly lose their high sensitiveness and clear working qualities, but this can be overcome by exercising care so as to avoid stale plates. The difficulty is one, moreover, which can hardly occur with reputable plates for a couple of years or more after their manufacture.

Orthochromatic films have also been passed without special mention because their manipulation is in every respect the same as for plates.

**Acknowledgments.** Here, I must close this already too-lengthy introduction to orthochromatic photography. Warm acknowledgment is given to Mr. Milton B. Punnett for valuable help in the preparation of the pages devoted to color sensitizing of plates, screens, etc.; to Dr. L. A. Weigel, Mr. B. J. Edwards, Mr. W. C. Paul, Mr. John Carbutt and the G. Cramer Dry Plate Co., for assistance in many details, and last but not least, to those who have sent so many beautiful examples of orthochromatic photography for the embellishment of this number of THE PHOTO-MINIATURE. Their work is, indeed, a stronger and more attractive argument in favor of orthochromatic photography than I have been able to put forward, but I trust the text will prove as interesting to the reader as its preparation has been to the writer. The most convincing argument, however, is an actual trial with orthochromatic plates and a screen, against an ordinary plate, on any subject exhibiting colors of varying luminosities. The man who will make this test intelligently and without prejudice will rarely, if ever, go back to the older and less perfect way of photography with plates whose sensitiveness embraces only the least luminous aspects of nature and art.

## BOOKS.

Strange as it may seem, there has been no manual dealing directly with orthochromatic photography published for the English reader since Eder's *Chemical Effect of the Spectrum* appeared in 1884. Among recent books in which the subject is interestingly dealt with, I may mention Abney's *Action of Light in Photography* (1897) ; Leaper's *First Principles of Photography*, Harrison's *Chemistry of Photography* and Meldola's *Photographic Chemistry*. Among the many papers concerning orthochromatism scattered throughout the American and English photographic journals since 1880, those by Bothamley, Wall, Duchochois, Ehrman, Abney, E. Sanger Shepherd, and James Cadett are especially valuable for their practical information.

# NOTES

We are late this month, and the October number, dealing with "Platinotype Processes," will not be ready until October 12th or thereabouts. After that we hope to resume the publication of THE PHOTO-MINIATURE on the first day of each month. Will readers please note that the earlier numbers of the magazine are always obtainable either direct from the publishers or through any dealer in photographic supplies, newsdealer, or bookseller throughout the United States, Canada, and Mexico. If any difficulty is experienced in obtaining THE PHOTO-MINIATURE, we will appreciate the favor of particulars, so that we may straighten the matter out.

◆

The Portland, Me., Camera Club, organized last May, purposes, with commendable enterprise, to hold its initial *Salon* in November. The *Salon* is intended to ascertain the position of amateur photography in the State, and we trust that the effort will meet with generous response. Particulars may be had from Mr. J. Harry Lamson, 5 Temple Street, Portland.

◆

Herr C. P. Goerz, manufacturer of the *Double Anastigmat*, notifies us that the growth of his business necessitates a further addition to his new factory, and the opening of a new branch establishment in London's busiest thoroughfare, 4 Holborn Circus, E. C., of which Americans visiting London should make a note.

◆

*How to Enjoy Pictures*. By Mabel S. Emery. 287 pp., with 53 half-tone engravings from examples of the various schools of painting. $1.50. Edward L. Wilson, New York.

There has long been need for such a volume as this, which, in an instructive and attractive way, tells the picture-lover how to obtain more enjoyment from his study of pictures. A more important point, however, is that those who have often wished to understand and enjoy pictures may secure the secret from Miss Emery's delightful volume. It should be read and re-read by every picture-maker in the land.

◆

One of the most useful helps to the student of orthochromatic photography is *Prang's Standard of Color*, a beautifully printed series of seven plates, comprising "an ideally complete series of colors," with almost all the possible varieties of light and shade contrast. A study of this *Standard* and its accompanying notes will enable the amateur photographer to understand the difference between *the hue* and *the luminosity* of colors better than any other way known to us.

◆

The Gray-Lloyd Manufacturing Company, with factories at Undercliff, N. J., and offices at 401 West Fifty-ninth Street, New York, is a new optical firm organized to take over the lens business of Mr. R. D. Gray, whose *Extreme Angle Periscope* is well known among photographers.

The specialty of the company will be a new American anastigmat—the *Plano*—a lens with all the peculiar characteristics of the anastigmatic type, extreme definition over a wide field, freedom from astigmatism, and working at *f*/4, thus coming, in point of speed, between the Zeiss *Planar* and the *Collinear* Series II. The performance of this new lens will be watched with much interest.

◆

*The Photo-American* (22 East Seventeenth Street, New York) announces, in its August and September issues, a photographic competition of unusual interest to amateurs. The classes embrace *General Excellence*, *Genre*, *Landscape*, *Flash Light*, *Portraiture*, and *Illustrated Jokes*. The prizes, value $150, comprise an attractive array of things photographic, from cameras valued at $10 to a year's subscription to *The Photo-American*.

Apart from this competition, which will undoubtedly bring *The Photo-American* some good amateur work, the paper itself is "a good thing," which every amateur

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And everything required in Photography by the AMATEUR or PROFESSIONAL

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Kindly mention THE PHOTO-MINIATURE

should see regularly. Its articles are brimful of that mixture of practical information and human nature peculiar to amateur "experiences," and the pages "Chat Here and There," by the editor, are among the bright spots of photographic journalism.

◆

An orthochromatic plate which is little known, but warmly praised by those who use and know it, is the orthochromatic plate made by V. E. Forbes, of Rochester, N. Y. Our experience with this plate proves that it is of excellent quality, both in the character of the emulsion and "color sensitiveness." We suppose the plate can be had from any dealer, but prefer to get our supplies direct from Mr. Forbes, thus ensuring fresh plates.

◆

The readers of THE PHOTO-MINIATURE are doubtless already informed of the consolidation of the principal manufacturers of printing-papers, effected some weeks ago. The consolidation comprises the plants and good will of the American Aristo Company, the photographic paper business of the Eastman Kodak Company, the Nepera Chemical Company, New Jersey Aristotype Company, Photo Materials Company, and Kirkland's Lithium Paper Company, and the combined capital is $5,000,000.

The announcement of this gigantic enterprise, by which the General Aristo Company will control the importation and sale of printing-papers throughout North America, has led many to suppose that prices will be increased and other monopolistic features introduced. There does not seem to be any grounds for this supposition. The various concerns are to be operated separately (for the most part), as before, and the new firm will seek to maintain its business by the old methods of giving the consumer good value for money received and heading off competition by increasing the merit of its goods. In other words, the consumer of printing-papers is likely to gain, rather than lose, by the consolidation of interests.

◆

Amateurs desiring a free trip to the Paris Exposition should write to the Ray Camera Company, 220 Centre

MILLEN'S CHROMIUM FIXING SALT

ST LOUIS OFFICE, 2005 Lucas Place. NEW YORK OFFICE, 57 E. 9th ST

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WORKS AT WOODLAND, MO.

M. A. SEED
DRY PLATE
COMPANY.
ARROW BRAND

*ST. LOUIS, April 1, 1899.*

*J. C. Millen, M. D.*
*Denver, Colo.*

*Dear Sir:*

*Your esteemed favor of the 28th ult. was duly received, and we regret that we have not been able to report to you before on our results with your Chromium Salt and Chromium Fixing Salt, having been extremely busy on account of alterations in our factory which have been going on while at the same time we were obliged to manufacture right along, not being able to stop until our arrangements could be completed. However, what you have sent us has been tested lately, and our Chemist reports that his results with these Salts have been highly satisfactory. He has tested same with our Opals and obtained very clear delicate whites. This is a severe test, and if this Fixing Salt is good for Opals it is certainly excellent for almost everything else as it simply means perfectly clear shadows without stain or any other defect. We wish you success with these articles, and are sure that they only need to be known to be appreciated. Hoping you will excuse the delay in our reply, owing to pressure in our regular work, we are*

*Yours truly,*

*M. A. SEED DRY PLATE CO.*

*M. A. S.*

Send to the Manufacturer for Descriptive Circular

Kindly mention THE PHOTO-MINIATURE

Street, Rochester, for particulars of the 1900 competition. Those who don't secure the round trip ticket to the Exposition will have a chance to secure $100 in gold and Ray cameras ranging in value from $60 to $5.

◆

The Pacific Coast Photo Dealers' Association is an organization comprising the principal supply dealers of California, and has for its object the betterment of business conditions on the Pacific coast. George H. Kahn, P. O. Box 2538, San Francisco, is the secretary of the association, which has our best wishes for its success.

◆

*Living Pictures: Their History, Photo-production, and Practical Working.* By Henry Hopwood. 275 pp. 242 illustrations. Price $1.25. Published by *The Optician and Photographic Trades Review.* London. (Tennant & Ward, N. Y.)

This is the latest and decidedly the best book published, dealing with what is popularly known as animated photography—the production of photographs of scenes showing the actual life and movement of the scenes. Mr. Hopwood has done his work in a very thorough and painstaking manner and has produced a book which will undoubtedly serve for many years as the standard work of reference, as well as the most interesting book on this subject.

◆

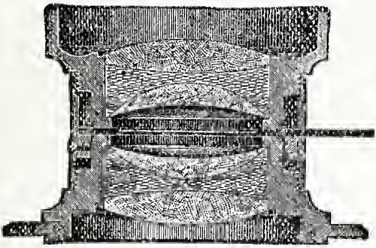
"We are a year old, if you please," is the title of an attractive little booklet issued for distribution *gratis* by John Curtis, dealer in photographic supplies, 1537 Columbia Ave., Philadelphia. For those starting a photographic supply business this little pamphlet offers many valuable suggestions, and we feel sure that it has materially strengthened the hold Mr. Curtis has upon his patrons. We congratulate him upon his well-deserved success.

◆

A Southern friend sends us a Mobile paper announcing the invention by a Mobile man of a valuable device for utilizing photography in war. The device evidently consists of a box-kite and camera fitted with a telephoto lens, operated by electricity. It is named the *Telephoto-aero-graph*, and at this point the description is

# THE GOERZ

# DOUBLE ANASTIGMAT



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UNITED STATES PATENT 528,155

Is the most perfect lens on the market, and the only truly corrected Anastigmat, as **it covers at full opening sharply up to the circle of light,** a thing no other lens does. The lens can therefore be used at full opening on a larger plate as a wide-angle lens. It is unequalled in its covering capacities, its speed and depth of focus.

Nearly all prominent photographers and advanced amateurs use the Goerz Lens. Mr. Alfred Stieglitz says:

> "Nine-tenths of my hand-camera work is done with a Goerz Lens. That is sufficient to show what opinion I have of your lenses."

**Catalogue and Test Chart on Application**

## C. P. GOERZ

**52 Union Square, New York**

Kindly mention THE PHOTO-MINIATURE

"continued on page 7." Unfortunately the paper does not contain a "page 7," nor can a continuation of the article be found.

❧

*The American Journal of Photography* continues to grow more interesting with each succeeding number. Its articles are thoughtful, well written, and always touch some point of practical utility, and Mr. Bartlett deserves praise for the amount of good, original (not reprinted) matter which he manages to offer every month.

❧

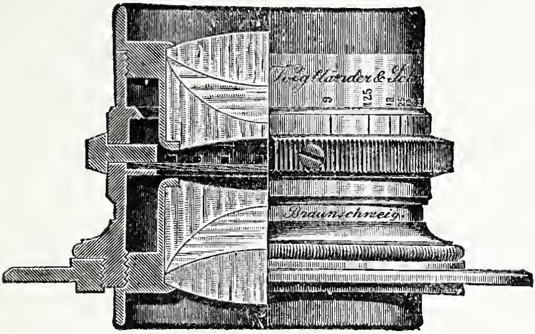
The interest in yachts and yachting being now at fever heat many readers may be glad to know that one of the most artistic collection of yacht studies in America is that published by Mr. C. E. Bolles, 244 Fulton St., Brooklyn. Mr. Bolles issues a catalogue.

❧

"AGFA" the new one-solution intensifier just introduced by the Actien-Gesellschaft fur Anilin Fabrikation, of Berlin, is a remarkably convenient and efficient darkroom aid. We have used it for some months and can recommend it especially for negatives developed with the modern developers, such as metol, amidol, etc., which do not always respond to the old intensifying methods as well as one would wish. "AGFA" is a clear, colorless solution, which is said to keep indefinitely, and merely requires diluting with nine times its bulk of water for immediate use. Intensification is generally complete in two or three minutes, and the solution may be used repeatedly. AGFA can be obtained from Mr. Geo. Murphy, 57 East Ninth Street, New York.

❧

The Scovill & Adams Co., N. Y., notifies us that it has just published a second edition of Woodbury's "Encyclopædic Dictionary of Photography," and a new and enlarged edition (sixth thousand) of "Amateur Photography" by W. I. Lincoln Adams. The *Dictionary* is one of the most comprehensive books of general reference dealing with photography, and should have a place in the library of everybody engaged in photography. Mr. Adams's "Amateur Photography" is already well-known as a simple and instructive guide for the beginner, and its popularity is well deserved.



## An Improvement for any Camera

The average double lens is by no means what it ought to be, but full of errors and defects. Low price and quantity production are fatal to precise work and scientific accuracy. A handsome camera deserves a perfect lens, for only such can produce proper results.

We can vastly improve your camera if you will let us put into it one of

## Voigtlander's Collinear Lenses

These lenses are what is claimed for them:

**ACHROMATIC SYMMETRICAL ANASTIGMATIC**
**RECTILINEAR CONVERTIBLE**
**BRILLIANT and SHARP SPEEDY**

*We fit to all styles of Long Focus Cameras*

**COLLINEAR II. F 5, 6**

*To all styles of Box Cameras, Cycle and Regular Folding Cameras*

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THE
**VOIGTLANDER & SON OPT. CO.**
*459 West 14th Street, New York*

Kindly mention The Photo-Miniature.

*Naturalistic Photography.* By Dr. P. H. Emerson. Third edition, revised, enlarged, and rewritten in parts for American photographers. 463 pp. $3.50. The Scovill & Adams Company, New York.

Here we have a *book*, without reading which no photographer — amateur, professional, or student — may truthfully say that his education is complete. It is, primarily, a book full of ideas—ideas with which one will quarrel as often as one will agree, and herein lies its value. One is obliged to re-read and think, two processes which oft beget revision of opinion. The book may roughly be divided into two parts, one theoretical, the other practical. The latter offers much direct information touching the various processes of photography in common use. The former is largely devoted to Dr. Emerson's opinions about art and its belongings. Suggestions abound, and however we may disagree with what Dr. Emerson sets down in forceful but graceful English, there is no getting away from the fact that what he says is, for the most part, worth the reading, something which one would rather not have missed. Wherefore, let "all to whom these presents come" get *Naturalistic Photography* and read it, with the assurance that their reading will bring them better photographs and more pleasure in their photography.

P. S.—We will not lend *our* copy.

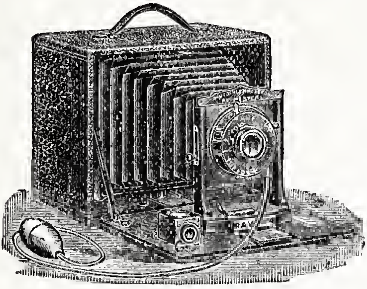
◆

Among the most pleasurable recollections of the few days we spent at the national convention at Celoron last July—only a few weeks ago—is the memory of an hour's chat with Mr. Mendenhall, representing the A. M. Collins Manufacturing Company, of Philadelphia. The embodiment of physical health, genial, alert, considerate, and broad-minded, he was a favorite with everybody. Yesterday we received the sad news that he died at St. Louis, Saturday, September 2d, after a sharp attack of pneumonia. May the earth rest lightly on him.

◆

The G. Cramer Dry Plate Company, St. Louis, Mo., whose *Isochromatic* plates are prime favorites with the increasing number of photographers awake to the advantages of plates that are color-sensitive, is about to issue a *Pocket Manual* of practical information which will be worth looking for.

# RAY CAMERAS



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**BECAUSE** they excel others in superior workmanship, ease of manipulation and elegance of appearance.

**BECAUSE** they are fitted with BAUSCH & LOMB LENSES and Shutters---the best in the world.

**BECAUSE** our Amateur Photo Contest---giving a FREE TRIP TO THE PARIS EXPOSITION, $100 in gold and 12 other Prizes has created the demand.

**BECAUSE** they are the best value for the money and all live dealers handle them.

SEND FOR FREE CONTEST CIRCULAR
AND CATALOGUE

RAY CAMERA CO.
220 Center Street
ROCHESTER, N. Y.

The new factory of this company is now completed, and the additional plant thus available is busily occupied with orders which had, necessarily, been delayed by building operations. It is now announced that all orders will be filled promptly on receipt, an announcement which will be "good tidings" to those who appreciate the fact that Cramer *Crowns* are among the necessities of life in the dull days from October 1st to September 30th.

◆

*The Right Road to Photography*. By Dr. John Nicol. 104 pp. Illustrated. Paper covers, 75 cents. Cloth, $1.00. Published by G. Gennert. New York.

This long-promised book is ready at last, and we have read it from cover to cover with a great deal of pleasure. Typographically a poor job, and with text illustrations that are execrable, it is, nevertheless, just the book to put into the hands of the beginner who asks for a really helpful introduction to every-day photography. Dr. Nicol writes simply and from experience; his knowledge of the amateur's difficulties is wide and varied; hence he touches just those points which mere bookmakers so often miss. The publisher informs us that the first edition of the work is almost exhausted—of which we have little doubt, having ourselves purchased a large part of the edition to satisfy the needs of Dr. Nicol's many admirers among the readers of THE PHOTO-MINIATURE.

◆

A very dainty catalogue, with much interesting information about photographic specialties which deserve to be widely known, has reached our table from the Manhattan Optical Co., of Cresskill, N. J. *The Long Focus Wide Angle Wizard* camera introduced by this firm should be seen by all who are dissatisfied with the focal extension of the average hand-camera. The length of bellows in this instrument is for the 4 x 5 camera, 22 inches; for the 5 x 7 camera, 26 inches. We had an opportunity, while at the Celoron convention, to examine this and other cameras made by the Manhattan Optical Co., and found them at once attractive and thoroughly well made.

# Seven Solio Years

Since Solio was introduced, in 1892, a score of papers have sprung into brief popularity, and have been forgotten. Time has proven Solio

## A Permanent Success

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One cause for Solio success is the absolute purity of the stock upon which it is coated. Nothing but the best imported stock (Steinbach and Rives) is used in the manfacture of our papers.

EASTMAN KODAK CO.

*For sale by all dealers* Rochester, N. Y.

Kindly mention THE PHOTO-MINIATURE.

A novel printing machine has been introduced by the Nepera Chemical Co., Nepera Park, N. Y., by means of which a great number of Velox prints may be made and finished in a few hours. The machine consists of a small box about two feet long, and a foot wide, containing a roll of sensitized paper from two to three hundred feet long. The negative is placed in the lid of the box, and the sensitized paper passes along beneath it. Once the correct exposure for the negative is obtained, only two motions are necessary to the making of the print. As the exposure is made, the number is registered, and a fresh piece of paper is placed under the negative. In this way it is possible for a printer to turn out from five to six thousand prints in a single day. The machine has attracted considerable attention, and will undoubtedly prove a great convenience to commercial photographers as well as firms who can use large quantities of photographs in business.

◆

Since the introduction of *Aristo-Platino Single Toner* the use of *Aristo-Platino* paper has wonderfully increased among amateur photographers. The manipulation of the paper, when Single Toner is used, is exceedingly simple, and the results are fully equal to any we have obtained by the double gold and platinum process.

◆

H. A. Hyatt, St. Louis, Mo., has issued a very attractive catalogue of supplies for amateurs, No. 102, which he will be pleased to mail to any address. It contains the latest list of new cameras by the best makers, particulars of the Leigh *Combination Photograph Printing Frame*, with a thousand other specialties of interest.

◆

*Penrose's Pictorial Annual*, 1899, is announced to be ready in October. This is the only process year-book for English and American readers, and is remarkable for the number and beauty of its pictorial supplements by the different reproductive methods. These represent not only the latest possibilities in well-known processes, but also all the methods which have been introduced during the year, and form a collection of surpassing interest. The articles, about forty in number, are con-

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No yellow or mottled prints
No struggle with the elements

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tributed by illustrators and engravers well known on both sides of the Atlantic, and offer much valuable information for process workers. Messrs. Tennant & Ward, 289 Fourth Avenue, New York, have the sole American agency for the *Annual* and will gladly send a detailed prospectus on receipt of request.

◆

The Walzl-Cummins Co. is the style under which a consolidation has been effected of the two photo-supply businesses of the Cummins Photo Stock Co., and S. E. Walzl & Co., of Baltimore, Md. These firms have always enjoyed a reputation for progressive enterprise and fair dealing, and we wish every success for the new combination.

◆

Mellen's clever little pocketbook, *New Pointers for Amateurs*, has reached its second edition of ten thousand copies, which fact talks louder than any praise we can give it here. It is full of good "tips" about a thousand and one things of interest to the amateur. Here is one of the best things in the book:

"A fifty-cent lens would photograph *any* subject in some sort of a way, but a $50 lens of the same size, apparently, would do the work very much better. If you want to know *why* one lens, having the same general appearance to another, photographs entirely differently, get the April, 1899, number of THE PHOTO-MINIATURE, a new monthly magazine published by Tennant & Ward, of New York, costing twenty-five cents. It is the easiest understood of anything I have ever seen on lenses, and the same with anything else they feel disposed to talk about."

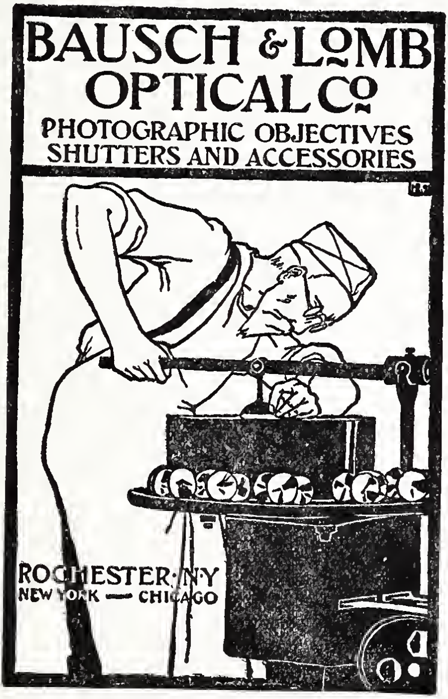
◆

*Tolidol* has been adopted by Mr. F. E. Ives for the development of his *Kromskop* negatives and transparencies. This speaks well for *Tolidol*, inasmuch as *Kromskop* photography demands at once efficiency and power of control in the development of the kromograms, and these qualities Mr. Ives says he finds in *Tolidol* after extended trial of other developing agents.

◆

Great progress is being made with the exhibition of photographic apparatus which will be held at Madison Square Garden, New York, next month.

ART CATALOGUE



POST FREE

One of the most interesting features of the exhibition will be a very fine historical collection which has been loaned by some of the leading workers in photography on the other side of the Atlantic.

The early literature of photography is thoroughly represented and one of the books exhibited, published in 1761, some seventy years before the discovery of photography, contains a marvellous prophecy of the making of pictures by light, even going so far as to indicate the necessity of a dark room. The title of this book is "Giphantia," or "A View of What Has Passed, What Is now Passing, and, During the Present Century What Will Pass in the World," in old English, and instantaneous photography is referred to in these words: "The elementary spirits have studied to fix these transient images; they have composed a most subtle matter, very viscous, and proper to harden and dry, by the help of which a picture is made in the twinkle of an eye. They do over with this matter a piece of canvas and hold it before the objects they have a mind to paint. The canvas, by means of the viscous matter, retains the images. This impression of the image is made the first instant they are received on the canvas, which is immediately carried away into some dark place; an hour after, the subtle matter dries, and you have a picture so much the more valuable as it cannot be imitated by art or damaged by time."

Possibly the most interesting photographic work extant is a large volume known as the "Photographic Album for the Year 1855." This is copiously illustrated with actual photographs, made by the great workers of that day, illustrating the various photographic processes then in vogue. There are forty-four of these photographs by such workers as Mansell, Rejlander, Bedford and Fenton. These photographs are now forty-four years old, but are in a most excellent state of preservation and compare more than favorably with the work of to-day.

"Taylor's Photographic Memoranda" is a publicarion illustrated by actual photographs and accompanying it are the four original calotype negatives from which the four prints were made.

Three stereoscopic-daguerreotypes, which created a sensation at the exhibition of photographs at the Crystal Palace last year, are on exhibition and bear out the

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Perfect
Pictures

THE
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Combines great compactness without loss of strength and rigidity. Made in a large variety of styles, $5.00 and upwards. Each one guaranteed

1899 catalogue
sent on application

**Rochester Optical Co.**

**32 South St., Rochester, N.Y.**

statement that a stereoscopic-daguerreotype is the finest picture possible by photography.

The calotype process is exceedingly well represented, some very large calotypes made by Henry Taylor about 1855 being possibly the best specimens extant. Five calotypes of Rye are exceedingly interesting. Other interesting prints are " Stonehenge," "Salisbury Cathedral" and the "House of the Five Gables" at Stratford-on-Avon.

Another remarkable work is Daguerre's "History and Process of Photogenic Drawing," published by Daguerre in 1839, containing the bill granting him a pension, Arago's address before the French Academy announcing the discovery of photography and the correspondence between Daguerre and Niepce.

❧

The Photographic Society of Philadelphia sends to our table a photograph of the steamer Hazel Kirke, which has been engaged by the Society to attend the Dewey Day festivities in New York, September 29th. A dark-room and other photographic conveniences have been provided for the members of the Society participating in the excursion, and those on board will doubtless have an enjoyable time.

An effort is also being made to arrange for a boat to take part in the international yacht regatta, October 4th. Those desiring to take a share in this latter adventure should write Mr. W. H. Rau, 1324 Chestnut Street, Philadelphia.

❧

The M. A. Seed Dry Plate Co., St. Louis and New York, has made orthochromatic plates *on order* for many years, but now announces its intention to put on the market, at an early date, an orthochromatic plate of high general color-sensitiveness. The introduction of this new plate will be awaited with considerable interest.

## Professional, Scientific and Amateur Photographers

patronize the following articles made in this country. Convenient form, low prices:

**TOLIDOL** recommended by dry plate and paper manufacturers, by professional and amateur experts as an ideal developer.

**SENSITOL** for sensitizing and printing on paper, silk, cotton, linen, leather, stone, etc.

**TONIFIXOL** neutral and acid, combined gold toning and fixing powder. No sulphur tones. Prints do not fade.

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Silver Intensifiers and Reducers, Accelerators, Retarders, Hardeners, Flashlight Powders, C. P. Dried Sulphites and Carbonates.

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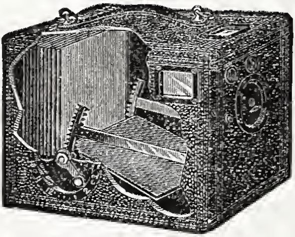

Loads 12 plates. Takes 12 pictures without opening the box. Twelve in ten seconds if you're in a hurry. Is fitted with **New Adlake Metal Shutter** with four stops; the only shutter ever made for fixed focus camera not affected by warping or shrinking of shutter board. The Exposure Register has self-locking Exposure Lever preventing more than one plate leaving the magazine at a time. The best single achromatic lens—removable lens holder. The Repeater is perfect in plan and action.

| | |
|---|---|
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| **Adlake Repeater, 4 x 5,** | **$8.00** |
| **Adlake Regular, 3 1-4 x 4 1-4,** | **$6.50** |

With 12 Single Metal Plate Holders—Light tight—dust proof.

**Adlake Regular,** with 12 Single Metal Plate Holders, 4 x 5, - **$10.00**
**Adlake Special,** with 12 Single Aluminum Plate Holders, 4 x 5, **$12.00**

New Adlake Metal Shutter. Portrait attachment. Device for making panoramic pictures FREE with all Adlakes. New Multiplex Attachment for taking 2 to 4 pictures of same object in different positions on one plate, **$1.00** extra. New 1899 Adlake Booklet FREE. Mounted photo 5 cents stamps.

**New Devices on all 1899 Adlake Cameras**

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Makers of Adlake Bicycles, X-Rays Cycle Oil Lamps, Adlake Acetylene Cycle Lamps.

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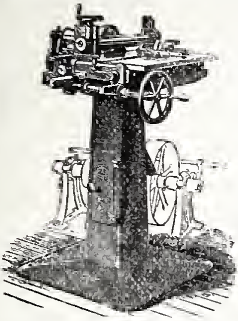

the Royle Beveler is the best and quickest device. Small plants, however, do not need so large and efficient a machine, and for such we have a BEVELING PLANE which we sell at a very low price. It will do neat, clean work, and is a valuable tool in a small establishment.

JOHN ROYLE & SONS
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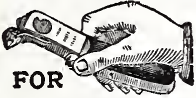

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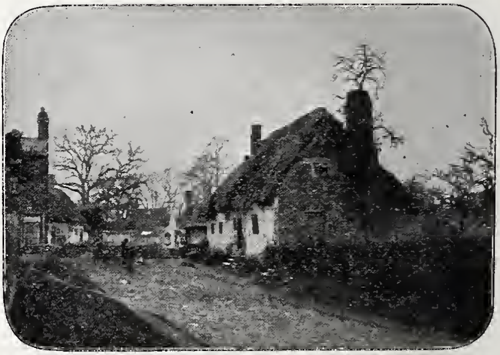

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THE PHOTO-MINIATURE
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Vol. I OCTOBER, 1899 No. 7

# PLATINOTYPE PROCESSES.

The first intention, and the last end, in all photography is the print. The negative is essential, but intermediate, preliminary. The real purpose of all we do, the thing aimed at, is the print—the literal or pictorial record of what the eye saw. Photography is so full of pleasures, and, in its initial processes, opens up so many delightful by-ways, that we are apt to forget this. It is the most significant of photographic facts. As novices, we hear so much about the negative and negative making that all else seems merely supplementary. This early impression persists and, photographically, we grow up without an adequate appreciation of the print and its importance, or of the keen enjoyment to be had in its making.

Of course, we all make prints, or think we do. But to be honest about it, the majority of them are mere proofs, rough sketches suggestive of what we attempted to record. The print proper should be the final expression of the subject. In prints by such masters as Robinson, Demachy, Hinton, Stieglitz, Keiley and others, we lose sight of the negative in the revelation of the subject, and find a thousand subtleties of form, color, tone, and effect, of which the negatives tell us nothing. Not that by this I intend to belittle the negative, or say that its quality is a matter of small importance; but rather that the negative, whatever its qualities may be, is, after all, only a means to the end, the beginning and not the end of our work in photography. It is a common expression, when this or that picture at an exhibition compels our admiration : What a wonderful bit of negative making ! Let us correct this error, the natural result of our one-sided and incomplete training. The quality we really admire belongs to the print, is the consummate skill which, by means of a negative, a sheet of paper, and a limited range of tones, has given us a perfect reproduction of the subject as the picture-maker saw it. It is from this point of view that the making of the print is seen to be the most interesting of photographic experiences. And this is equally true whether the subject of the print be a brass bedstead or a winter sun setting over fields covered with snow.

**Advantages.** As far as the negative is concerned, we are limited to the possibilities of a single process. It is a question of what may be done with light and chemicals on a film of bromide of silver. For the production of the print we may choose from a rich variety of methods and materials, and with each one obtain totally different results from the same negative. Here is one of the points of interest in the making of the print; the individuality of the worker has an unlimited field. He can do what he will. I need not detail here the many methods for making photographic prints—in pigments, iron, uranium, silver, and gold. They will be dealt with in future numbers of THE PHOTO-MINIATURE with the completeness essential to a knowledge of their possibilities. In this little book we will confine ourselves to the processes for obtaining prints in platinum, as being of chief interest at the present moment. And if any other reason be asked why platinum printing methods are given the first place, it may be said at once that they offer us the simplest, most direct, and most satisfactory means of producing from our negatives, prints which are indisputably permanent and beautiful. Furthermore, since I am obliged to deal with commercial products, much herein written may read as a bold advertisement of this or that. Let me say again, therefore, that THE PHOTO-MINIATURE is made to help the practical worker, who necessarily takes advantage of whatever the market affords for his convenience, and that I speak of things as I find them, without prejudice.

**What is a Platinum Print?** Properly speaking, the name platinum print may be rightly applied to any print in which the image consists of metallic platinum. It should be clearly understood, however, that we cannot print direct in platinum as we do in silver printing. The salts of platinum, *per se*, are not darkened by exposure to light as the silver salts are in the familiar methods of silver printing—the use of print-out silver papers, for instance. The picture image in all platinum printing processes, therefore, is obtained by means of some other light-sensitive salt, such as iron or silver, and this temporary or *provisional image* is afterward replaced by the image of metallic platinum. In some methods this substitution of the final platinum image for the temporary (iron) image is complete and absolute. These are generally spoken of as platinotype methods. In other methods the temporary (silver) image is covered (plated, as it were), or more or less completely replaced by the platinum image. Such methods are usually known as platinum toning methods. Properly made, prints by all methods of platinum printing are equally permanent, and certainly equally beautiful. There is a subtle chemistry in this substitution of one image for another, but this need not trouble us. It concerns the chemist who prepares the paper. The actual manipulations in the various methods are exceedingly simple, and easily mastered even by the beginner. In fact, the amateur who once becomes familiar with the working and capabilities of platinum printing methods will hardly, if ever, be persuaded to take up any other.

**Permanence.** The permanence of a platinum print is apparent in the fact that an image of metallic platinum is indestructible, uninfluenced by the many causes which produce changes, fading or deterioration, in prints made by some other photographic methods. Here it should be noted that the absolute permanence or "life" of the print depends upon the simple nature of the image and its support—pure platinum on pure paper. These conditions are imperative. When we depart from them, we create complications which endanger the simplicity of the image, and thus open a way for chemical changes. This is of prime importance in considering the preparation of the paper support for the picture image, in the modification of the color of platinotypes, and in the toning of silver prints with platinum, of which we will hear later.

**Beauty.** The beauty of a platinum print arises from the fact that, distributed as it is in an exceedingly fine state of division (fineness of deposit) throughout the picture image, platinum yields exquisitely graduated tones of black and gray, most pleasing to the cultivated eye. Here we are reminded that the normal color of a platinum image must be black or a shade of black—blue-black, brown-black, gray, etc. Wherever we have color in a platinum print—green-blue, warm brown, red, sepia, etc., we may be sure that it was produced by the aid of other chemicals, and the result may or may not be as permanent as the simple platinum image. Nevertheless, it is possible to make platinum prints in other colors than black—warm brown, sepia, or red, for instance, by such modifications of the platinum image that we may depend on the result as being practically, if not absolutely, permanent.

**Simplicity.**

The simplicity, quickness, and directness of platinum printing is evident in the fact that, among its various methods is one in which the platinum image partly prints-out in the printing frame, is developed in water, and finished by washing in a bath of acidulated water. Thus we may produce from our negative a permanent and beautiful print within a very few minutes of time, and without the aid of anything more "messy" or complicated than a bath of acidulated water. It is often argued that platinum processes are more expensive than the familiar silver methods. As far as the first cost of the paper is concerned, this is true. With equally intelligent manipulation in the use of both processes, however, the difference in cost, print for print, is very trifling, and more than counterbalanced by the advantages of the platinum processes.

**The Various Methods.**

There are three principal processes used in making platinum prints. *First*, the *print-out* platinum method, in which the picture prints-out, becomes more or less plainly visible in the printing frame. Millen's *Etching Matte*, *Platni*, Jacoby's and Hardcastle's print-out platinum papers belong to this class. *Second*, the *development* method, which yields a barely visible image in the printing frame, requiring development before the print is completed. Papers of this class, such as those of Willis & Clements, Bradley's platinum papers, and, in England, The Platinotype Co.'s papers, *Platona*, and Jacoby's platinum paper, are sometimes called "cold bath," "hot bath," and "sepia" papers. *Third*, the *platinum toning* method, in which print-out silver papers, such as *Aristo-Platino* or plain salted papers, are used, the silver picture image being toned with platinum.

The preparation and use of papers belonging to each of these three classes will be dealt with separately.

**Character of Negative.**

In considering the use of platinum papers our first question naturally concerns the negative. Do we require a special sort of negative? The old idea that platinotype printing demands a special negative dies hard. It is a relic of the earlier days, when there was only one variety of paper—that for "hot-bath" development—in the market. It applies now *only* when we confine ourselves to a particular kind of paper, or insist on a certain uniformity of effect in all our prints regardless of their subject or sentiment. Under such circumstances, we naturally make our negatives, or select them, to suit the paper we use, or to give us, on that paper, the peculiar effects we desire. If we use, for instance, *Aristo-Platino* exclusively, we will quickly arrive at the fact that this or that kind of negative gives us the best results, and similarly if we use any other make of paper which is invariable in its composition. And common-sense tells us that, in platinotypy, as in other printing methods, the character of the negative necessarily influences, if it does not determine, the general character or appearance of the print. Similarly, if we want a technically perfect print, without considering pictorial effect or sentiment in the subject, it is quite likely that some process other than platinotype will give us a better result than platinum paper can do. Apart from this, any negative which gives a satisfactory print on albumen, collodion, gelatine, or bromide paper, will also yield a satisfactory print on platinum paper. This is made possible by the many varieties of platinum paper now obtainable, differences of color of image, surface texture of paper, etc. Each variety possesses its own peculiar characteristics. And there are innumerable ways of modifying platinum prints when the direct print from the negative does not please us. The important thing to remember is that the platinotype processes offer as much latitude, as far as negative used, or appearance of print is concerned, as almost any other printing process. But we must be familiar with our materials, and know what may be done with them to secure the effects we desire from the particular negative in hand.

Speaking generally, the beginner handling *print-out* or *development* papers will do well to make his first prints from a well-timed (fully exposed) negative of medium density. This class of negative, with plenty of detail, but without hardness, and free from "veil" or fog, is perhaps that best adapted for the various platinum methods in general use. *Print-out* papers are suited to negatives full of half tone; *development* papers will stand a more vigorous negative; and matt-collodion or plain papers for platinum toning will, normally, give good results with what may be described as a strong negative, but without harsh contrasts; in other words, a negative well exposed for detail and half-tone, and fully developed, but with all the details kept in the high lights. As far as the development of negatives for platinum is concerned, we may use any of the available agents. It is generally conceded that *pyro-soda* gives a good printing negative for the purpose, but I have used *tolidol*, Millen's *Normal* developer, *ortol* and *pyrox* with equal success. Negatives of a good black, or greenish-brown color have better printing quality than those in which grays and blue-blacks predominate, as is the case when *eikonogen*, *metol*, etc., are used. An acid fixing bath is desirable, as clearing any fog or "veil" from the negative, but all these details are best regulated by personal opinion, and the suggestions are simply indicated by my own experience.

We will now take up the three platinotype processes in general use and, treating each one separately, glance at their underlying principles, the preparation of the different kinds of paper, and their manipulation. Should anything appear which is not quite plain at the moment, let the reader hold his patience a little, and the difficulties will disappear as he becomes familiar with the methods and materials employed.

**Print-out Papers.**

First, in order of simplicity, comes the *print-out* method of platinum printing, so called because the image prints-out or becomes visible in the printing-frame. It was introduced by Pizzighelli in 1887, but has been much modified, and introduced in various forms since that date. In papers prepared by Pizzighelli's method, the sensitizer *and* developer, *i.e.*, *ferric* oxalate in combination with potassium oxalate or sodium oxalate, and the platinum salt, *i.e.*, chloro-platinite of potassium, are spread upon suitably "sized" paper, which is then dried *and kept dry* until the moment of actual use. Upon exposure to light under a negative (with certain conditions as to dampness of paper, temperature, etc., peculiar to the process), the picture image is formed by the reduction of the *ferric* oxalate to *ferrous* oxalate which, as slowly formed by exposure, is sufficiently dissolved to cause it to react with the platinum salt, so that the image develops in part, *i.e.*, becomes partly visible or is "printed-out" as the exposure proceeds. Thus, almost simultaneously one might say, the provisional (iron) image is obtained and, in part, replaced by the platinum image. The image is, later, brought to the desired depth by immersing the print in hot or cold water, or holding it over a jet of steam from a kettle, according to the peculiarity of the paper used. Finally, it is immersed in a bath of acidulated water to "clear" it of the unused or unreduced iron salts, and again washed in water. In practice, this method is simplicity itself, and one asks why this method has not become universally used. The image consists of pure platinum, and such prints equal in beauty those produced by any other method. The method, however, is *supposed* to have several disadvantages. The paper does not "keep" well; it prints slowly, sunlight being essential if one is in a hurry; and, with some papers, the results have been uncertain, development lagging behind exposure and *vice versa*, according to the condition of the paper, temperature, etc. These defects are being rapidly overcome by improved methods of manufacture. *Etching Matte*, for instance, keeps its good quality for several months; the action of development *during* exposure is restrained, to be effected later in the water bath, where depth of tone, etc., may be controlled; and it prints about four times quicker than "blue" print paper.

**Preparing Print-out Papers.** In giving formulas for the preparation of platinum papers my intention is to inform the reader, rather than to encourage him in their preparation for his own use. In practice, this is more difficult than would appear from the description, and it is both more convenient and more economical to use the excellent ready-prepared papers in the market.

To prepare *print-out* platinum paper obtain a few sheets 20 × 26 inches of any good, pure paper made for photographic purposes. A heavy *Saxe*, or *Rives No. 74*, or *Arnold's pure unbleached*, or *Whatman's No. 1* will be suitable. All these papers need to be "sized," *i.e.*, coated with a size to keep the sensitizing solution on the surface, and so prevent the image from sinking into the paper. To prepare such a size, rub 10 grains of arrowroot flour into a stiff paste with a little water, add to this, constantly stirring, 2 ounces of hot water, and bring the arrowroot solution to boiling point, when the milky color will disappear. Now add half-an-ounce of alcohol, stirring as before, and, after straining, the "size" is ready for use. To size the paper immerse it in the sizing solution for two minutes, hang it up by one end to dry, and when dry, repeat the sizing. In drying the second time, reverse the paper end for end, so that the coating of size is uniform all over the paper. The paper must be thoroughly dry before it is sensitized.

To sensitize, prepare the following solutions: A. Sodio-ferric oxalate, 600 grains; three per cent. solution of sodium oxalate (neutral), 3½ fluid ounces; potassium chlorate, 15 grains. B. Chloro-platinite of potassium, 150 grains; distilled water, 2 fluid ounces. For each sheet of paper 20 × 26 inches, mix 136 minims of A with 85 minims of B. To obtain warm black or brown tones with this paper add 1 grain of mercuric chloride to the above mixed solution. The sodio-ferric oxalate here needed may be obtained from Willis & Clements (or The Platinotype Co.). It is a light-sensitive salt and must therefore be protected so that no light reaches it. The formula here given is Wischeropp's modification of Pizzighelli's latest formula and may be relied upon if pure chemicals, pure paper, distilled water, and care are employed.

In sensitizing, apply the solution to the sized side of the paper with a camel-hair mop, spreading the solution evenly and without unequal pressure. When sensitized the paper should be suspended by one end for a few minutes until surface dry, and then quickly dried before a fire, or in a tin oven, after which it should be stored in an air-tight tube, fully protected from damp until needed for use. I need not say that the sensitizing of the paper should be done by gaslight, or by daylight entering the room through a single thickness of yellow fabric. The room should be warm, about 70° Fahr., and the coated paper should be kept from daylight.

The manipulation of print-out platinum papers, as already mentioned, is exceedingly simple. Among their peculiarities is that which makes a certain amount of dampness advantageous (if not necessary) in printing, so that, provided we keep our paper dry until we use it, we need not take any elaborate precautions against moisture during or after printing. It is commonly said that print-out papers give the best results with strong or dense negatives. This, however, depends on the variety of paper used. *Platni* and paper prepared according to Wischeropp's formulas given on another page require a fairly strong negative. On the other hand, *Etching Matte* and *Jacoby's* print-out papers will give very desirable prints from thin, and even flat, negatives. Hence, if we use a commercial paper, we must test its peculiarities with our own negatives and be governed accordingly.

**Exposure.** On account of the slowness of such papers, as compared with "cold-bath" papers, the exposure should be made in strong direct light out doors, preferably in sunlight, and the printing should be allowed to continue until the image is well defined. Some *print-out* papers give a fully visible black or gray image; others give an image of a deep canary or orange color in the shadows. In all cases the depth of the print desired may be judged about as we would judge of a silver print, except that we need not make any allowance for reduction of strength in finishing. When printing in damp weather, the prints should be allowed to print to greater depth than will be needed in bright, dry weather. With strong negatives printing should continue until the deep shadows are fairly full in color and the outlines clearly defined; with thin negatives it is sufficient if the shadows are well discernible. It is advisable to develop and finish the prints as early as is convenient after printing.

**Development.** To develop the prints it is generally sufficient to immerse them, direct from the printing-frame, in clear tepid water. If the exposure has been correct, the image will at once commence to develop and complete its development in a minute or two. This applies to *Etching Matte* and *Jacoby's* print-out paper. Other papers, such as *Platni*, require to be developed in hot water—about 120° Fahr. Or we may use the ordinary oxalate developer, heated to 130°–180° Fahr., diluted by the addition of an equal quantity of water. (Hardcastle's paper prints-out fully under the negative and requires no further development. As soon as printed, prints on this paper are "cleared" by immersion in a bath of hydrochloric acid, 1 ounce; water, 80 ounces, for a few minutes, and afterward washed in clear water.)

**Clearing and Washing.**

As soon as the prints are developed to the desired depth it will be seen that the high-lights still retain the original lemon-yellow tint of the unexposed paper. To "clear" or remove this from the prints they are immersed, direct from the water-bath or developer, in a bath of acidulated water, made up by adding one dram of chemically pure muriatic (or hydrochloric) acid to a quart of water. In this bath the prints should remain five minutes, not being permitted to pack together in a mass. The yellow tinge will now have disappeared, and after ten or fifteen minutes' washing in running water (or three changes of clear water of about five minutes each) the prints are finished and ready for mounting.

With some print-out papers it is advised to clear them in the ordinary platinotype "clearing" bath of one ounce of hydrochloric acid in sixty ounces of water. When a great many prints are to be "cleared," it is also advised to double the strength of this bath, *i.e.*, add two ounces of hydrochloric acid to sixty ounces of water. But clearing baths of these strengths should not be used for print-out papers without a preliminary test to ascertain whether they will damage the surface of the print.

Printed-out platinum prints are capable of being modified by intensification and toning just as are development platinum prints. As the manipulation is identical in each case we will deal with these methods of modifying later, after we have finished with platinotype printing.

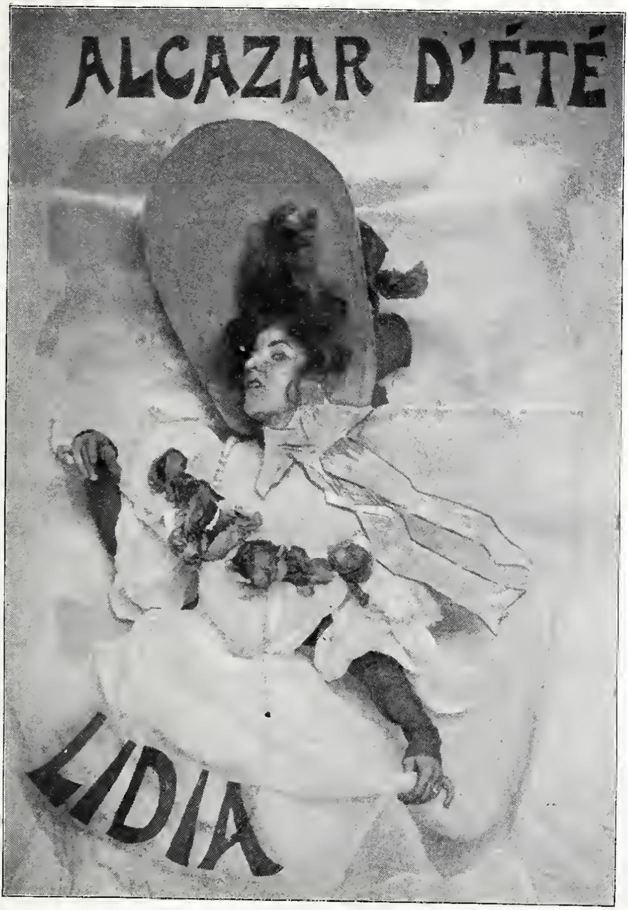
**Development Papers.**

The second method, really first in order of time, is known as the *platinotype* method, and was first introduced by Willis in 1873. Willis, by the way, may be said to be "the father of platinum printing," the various methods of to-day being based upon his labors and research. His early processes have been much modified and improved since their first introduction, the improvements tending toward greater simplicity of manipulation, and increased "keeping" quality of the paper. Papers of this class differ from *print-out* papers chiefly in the fact that they are coated with the sensitizer and platinum salt only, give a barely visible image in the printing-frame, and require the application of a developing agent to complete the print. Thus they may be described as *development* papers. As some varieties require development with a heated solution, while others are developed in a cold or cool solution, so they are spoken of as "hot-bath" or "cold-bath" papers according to their preparation. In this country the "cold-bath" papers are generally used. In England some few workers still cling to the earlier "hot-bath" method. There is practically no difference between prints produced by either method, although those long used to the "hot-bath" process hold the opinion that it gives richer effects and greater depth in the prints. Normally, the "cold-bath" method gives black tones; the "hot-bath" method gives black or sepia tones, according to the preparation of the paper and the developer employed.

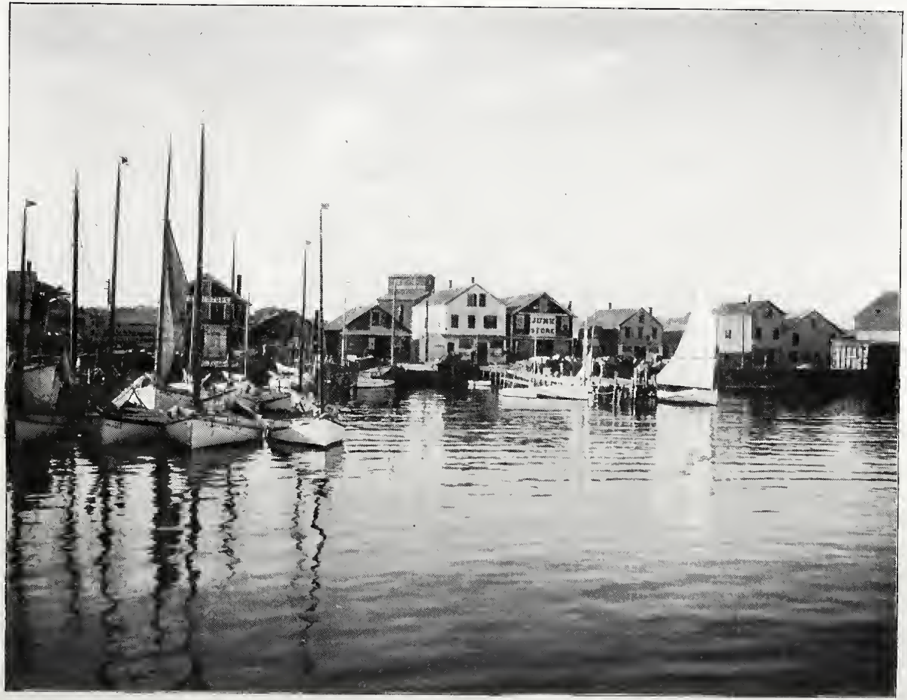
Briefly, *development* platinum papers are prepared as follows: Suitably "sized" paper, usually in sheets 20 x 26 inches, is coated with ferric oxalate and certain modifiers, and the platinum salt. It is then dried at a particular degree of heat, upon which its printing quality largely depends. Paper so prepared is abnormally sensitive to moisture or dampness, which is fatal to its printing quality. It must, therefore, be protected from the slightest dampness until used, and even in the printing-frame, as well as between printing and development. Upon exposure under a negative, the picture image is formed by the reduction of the *ferric* oxalate to *ferrous* oxalate, the platinum salt and the excess of ferric oxalate not used in forming the image remaining unaffected. Thus we get a provisional, barely visible, image consisting of *ferrous* oxalate and carbonic-acid gas. The development of this image—the substitution of a platinum image for that of ferrous oxalate—is effected by immersing the print in a solution of oxalate of potassium, which causes the ferrous oxalate to react with the platinum salt, reducing it, and leaving metallic platinum in proportion according to the amount of ferrous oxalate present in each part of the picture image. In this way the provisional iron image first obtained is absolutely replaced by an image in metallic platinum. The print is then "cleared" by immersion in several baths of diluted hydrochloric or citric acid, by which the iron salts remaining in the paper are removed, and, after a thorough washing in water, the print is finished. It will be noted that in both *print-out* and *development* paper the provisional or temporary image is composed of an iron salt, which is afterward completely replaced by the platinum image, so that the finished picture consists of an image of metallic platinum on a support of "sized" paper.

**Preparing Development Papers.**

The preparation of *development* platinum papers offers so many difficulties that I cannot counsel the reader to attempt it, even in an experimental way. It will be interesting, however, to know how it is done. For the paper support any of the papers already mentioned are entirely suitable. The formula and instructions for sizing the paper, previously given, may also be used in the preparation of *development* papers. Or, as variations, we may use a "size" recommended by Beanland as follows: 30 grains of arrowroot in 4 ounces of water, prepared as before, but without the addition of alcohol. Warren recommends 15 grains of arrowroot flour beaten to a cream in 1 ounce of water, and then poured gently and with careful stirring into 30 ounces of boiling water in a jar or *bain marie* (water bath), the whole being allowed to boil for eight minutes. In this "size" the paper is immersed for three minutes, dried, resized, and dried again. "E. A. R.," in *The Photogram*, recommends arrowroot, 20 grains; Nelson's gelatine, 5 grains; alum, 3 grains; water, 4 ounces. In preparing this the gelatine is allowed to swell in a small quantity of water; the water is then heated in an enamel pan to about 80° Fahr.—a moderate heat. The arrowroot is mixed with cold water to a thin cream and stirred into the water; the gelatine is dissolved by heat and added, then the alum, dissolved in a little water, well stirring all the time. The mixed solution is then allowed to remain just *under* boiling point for ten minutes. The paper is floated on this hot solution for three minutes, slowly drawn off from one end, and dried in a warm room, suspended by clips from a line. In sizing paper care is necessary to avoid air-bells (bubbles), and the best way to do this is to plunge the sheet into the solution, beginning at one edge. Abney advises two minutes' immersion as an average time. The sheet should be withdrawn slowly and steadily, without stoppage, so that as much superfluous solution as possible



POSTER DESIGN
Allen Drew Cook
*Untouched negative, from life*



By W. C. Paul

*The Gilbert Studio (A. F. Bradley & Co.), N. Y.*

be left in the dish. It is advisable to size twice, drying the paper between the operations, and to reverse the paper, end for end, during the drying.

**Sensitizing Cold Bath and Sepia Papers.** For sensitizing, Beanland gives the following reliable formulas, which, by a little modification, may be used in the preparation of "*cold-bath*" papers for black tones, and "*hot-bath*" paper for sepia tones. Prepare: —A. Chloro-platinite of potassium, 15 grains; distilled water, 90 minims. B. Ferric oxalate, 21 grains; oxalic acid, 2 grains; distilled water, 183 minims. For "cold-bath" paper, mix A and B, and add 15 minims of water. For *sepia* paper, mix A and B, and add 15 minims of a five per cent. solution of mercuric chloride. The addition of a few grains of potassium chlorate to any of the above, gives increased contrast in the print. From 140 to 170 minims of solution are sufficient to coat a sheet of paper 20 × 26 inches.

Lainer advises the following formulas for the preparation of "cold-bath" paper. Prepare the subjoined *Stock Solutions: No. 1.* Ammonium ferric oxalate, 1¾ ounces; distilled water, 2 ounces; ten per cent. solution of oxalic acid, 3½ drams. *No. 2.* Chloro-platinite of potassium, 30 grains; distilled water, 150 minims. For each sheet of paper 20 × 26 inches, mix 136 minims of No. 2 with 68 minims of No. 1, and 136 minims of a 1 in 25 solution of bichromate of ammonium. Lainer notes that this addition of the bichromate reduces the sensitiveness of the paper somewhat.

**Hot-bath Paper.** A convenient method for preparing "hot-bath" paper is as follows: Obtain from Willis & Clements (or The Platinotype Co.) a supply of their *Iron Solutions* A and B. These are special sensitizing solutions and are sensitive to light; the 8-ounce size will be amply sufficient. Mix these as needed for use in the subjoined proportions:—*A solution*, 3 parts; *B solution*, 7 parts. Of this mixture take 7 drams, make up to 1 ounce with distilled water, and add, dissolving by constant stirring, 48 grains chloro-platinite of potassium. The transparent ruby-colored crystals should be chosen, those showing a yellowish tinge being rejected. This solution will not keep more than 20 minutes, so that no more should be mixed than is to be used immediately. The sheet of paper is stretched upon a plate of glass rather larger than the paper, and fastened with clips at the corners. For spreading the sensitizing solution evenly a rubber squeegee, covered with sateen from which all the dressing has been washed out, is advised, and the solution is swept over the surface of the paper with an even motion. The sateen surface of the squeegee should be renewed every twenty minutes, otherwise the solution will become decomposed.

**Drying the Paper.** The drying of the sensitized paper is perhaps the most difficult detail in its preparation. The drying must be done quickly if the prints are to have any brilliancy ; if dried too slowly, the image, on development, will be muddy. The operation should be divided ; the first stage covering the surface drying, and occupying from 5 to 10 minutes, presuming the sensitizing to have been done in a room at about 70° Fahr. This first drying should be accomplished spontaneously, the paper being suspended by one end from a line, or laid down, sensitized side uppermost. The second stage should be accomplished as quickly and as thoroughly as possible, by artificial heat. Thus, as soon as the sensitized paper is surface dry, the sheet should be held before a fire, or over gas burners, or placed in an iron or tin oven on a small gas stove. The temperature at this stage should be from 100° to 105° Fahr., when from 2 to 4 minutes will be sufficient to finish the drying. The drying point is indicated by a change in the color of the sensitive surface ; from a pale lemon the tint changes to a deeper saffron hue, and the sheet crackles. Warren says that the temperature should be exactly 100° Fahr. and that no variation is allowable.

The reason for this extreme care in drying is that the sensitive salts must be kept on the surface of the paper as far as possible, and yet have sufficient hold upon it to prevent the image being washed off its support in development, " clearing," etc. If the paper dries too quickly, the salts will not adhere ; if it is allowed to remain damp too long, the salts will sink into the paper and a flat, muddy, granulated print will be the result. It is in the drying that home-prepared paper generally fails, the conditions requisite for success being hardly controllable unless one has special facilities. I need hardly point out that the sensitizing salt is light-sensitive, and must always be well protected ; or that the sensitizing of the paper should be done in a room lighted by gas, or daylight entering through a single thickness of yellow fabric.

**Storing the Paper.** It has already been pointed out that platinum papers are extremely susceptible to dampness and moisture, and that these are fatal to the obtaining of good prints. As soon as the home-prepared paper is dried, therefore, it must be stored in such a way that dampness cannot reach it. As a rule platinum paper is rolled, sensitized side outward, and stored in tin tubes, the joint of the lid being protected by a broad rubber band or strip of rubber fabric to prevent the ingress of air. The tin should be thoroughly dried by heat before being filled with paper, and in each tin there should be what is called a "preservative." This is a piece of short-fibred asbestos, soaked in a strong solution of calcium chloride, dried by intense heat, and enclosed in a piece of muslin. This acts as an absorbent of moisture within the tin. As it absorbs dampness or moisture it becomes soft; when this is observed it should be stripped of its muslin covering and dried hard on a metal plate over the fire or in an oven. As long as it remains hard and dry in the tin we may be sure that no moisture is present, and our paper is surely dry. This absorbent is inexpensive and should be renewed from time to time. It is found in all tins of commercial platinum paper and is most effective for its purpose.

**Printing Development Papers.** In the use of *development* platinum papers our first care must be to keep the paper absolutely dry, not only before and during exposure, but also after exposure until the moment of development. This is one of the characteristics of papers of this class—their extraordinary susceptibility to dampness. When ready to print, therefore, presuming our paper to be dry, we must thoroughly dry, by means of heat, our printing-frames, the negatives, and the pads to be placed behind the paper in the frames. To preserve the paper from dampness during printing—a precaution especially necessary in dull, raw weather, or in sea-coast towns where humidity has to be considered—the pads used in platinum printing are usually thin sheets of rubber, or rubber fabric such as we buy for focusing cloths, dark-room aprons and the like. An old film negative is an excellent substitute, and is simpler in practice than a sheet of rubber.

**Exposure.** The exposure of papers of this class is undoubtedly the chief difficulty in their manipulation, but I think it has been largely over-estimated. Before exposure the paper is of a deep lemon tint, as shown in the frontispiece of this number of THE PHOTO-MINIATURE. As the exposure proceeds the image becomes faintly visible, gradually changing to a pale grayish-brown color. A little experience will quickly teach the reader to judge when the correct depth of printing has been reached. With a normal negative this point is indicated when we can just see all the details in the middle tones of the picture. Beginners generally over-expose, but after the first dozen prints have been made it will be comparatively easy to stop printing at a point which will give a good print. Thin negatives should be stopped as soon as the image is faintly visible. Paper which has become slightly damp gives a less visible image than paper absolutely dry; this point should have attention. The appearance of the image is also somewhat more difficult to correctly estimate with rough surfaced papers, because of the inequalities of the surface texture. Normally *development* platinum papers print in about one-third of the time required for silver print-out papers; hence if we expose a silver print alongside, under a negative of equal density, and stop the platinum print as soon as the silver print is printed just as we want it when finished, the platinum print will be fairly correctly exposed. Or we may use an exposure meter, such as Wynne's *Print Exposure Meter* and follow the instructions given with the instrument.

**An Actinometer.** Any print-exposure meter used in carbon printing will also serve for platinum printing. The meter is especially helpful when we attempt combination printing, *i.e.*, printing clouds into a landscape from a second negative. In this case the cloud negative is usually printed from first. For the convenience of those who may desire to make a print-exposure meter (or *actinometer*, as they are sometimes called) for themselves I make room for the following from *Photography*.

"Take a 4 × 5 printing-frame, fit a sheet of glass into the frame, and paste over it a piece of tissue-paper. Draw a line down the centre with a pencil, and then draw cross lines to divide the length into twelve equal spaces.

As there will be twelve spaces on each side of the line, there will be twenty-four in all. Cover one-half of the glass with twelve more thicknesses of tissue-paper, making thirteen in all. Now take a piece of the same paper the full width of the glass, but one division short in length, and paste that on top, keeping it up to one end. This is to be followed with other slips of the paper, each one division shorter than the previous one, until the last is a slip one division in length, but the width of the 4 × 5 glass. When these have all been pasted on there will be a gradation of tints ranging from one to twenty-four. Write the numbers with ink or water-color on each division close up to the central line, and the actinometer is complete. To use it tear a 4 × 5 piece of printing-out silver paper into four, lengthwise, and place one of them in the actinometer, so as to cover both rows of figures. Put another slip of printing-out silver paper in a printing-frame with the sky negative, place both frames out to print, and when the sky appears to be printed to the correct depth, not allowing for toning, the exposure will be about correct for platinotype paper. Note the highest number, which is just visible on the actinometer slip, and then expose a piece of platinotype paper behind the sky negative with a fresh slip of printing-out silver paper in the actinometer. When this latter registers the same number as at the first trial, develop the piece of platinotype paper, and if satisfactory mark the negative with the actinometer number, as 'Plat. six tints,' which will save the necessity of testing the negatives on any future occasion. When the skies of the prints have been printed, all that is necessary is to expose them behind the landscape negatives, properly masked, and expose in conjunction with the actinometer.

"If several sky negatives of varying densities are being printed from, and are placed to print simultaneously, one actinometer will serve for all by withdrawing each frame as its printing number has been reached."

When using an exposure meter we can easily ascertain the correct time of exposure required by this or that negative regardless of the conditions of light. This is an advantage, in that we may mark the time on our negative and so, on any other occasion, be sure that we could get a correct print by giving our paper the exposure indicated. Thus a negative marked P C B 3 W would tell us that the exposure needed for platinotype paper, "cold bath" was 3 tints on Wynne's print meter. It is simpler, however, to learn to judge the exposure by the appearance of the slightly printed image to the eye, and a little practice will make this an easy matter.

Sometimes it is advised to print strong, dense negatives in sunlight, and weak, thin negatives in the shade. The effect produced is largely a matter of opinion. I have not noticed much improvement in the print by either device. At times, or with some negatives, sunlight printing gives a flatter print than otherwise, and printing in the shade gives perhaps a little more contrast or a brighter print. This latter applies also to the printing from weak negatives under blue glass. The advantage gained depends upon the color of the negative.

When making vignettes, or printing from negatives with delicate half-tones, the progress of printing is, necessarily, more difficult to watch than usual. It is well in such cases to estimate the depth of the image by an unaffected portion of the paper, such as the narrow strip protected by the rebates of the printing-frame, or we can bind the negative with a narrow band of opaque paper. Very slight difference of color in the image may be easily compared in this way. All that is here said of exposure applies equally to "hot bath" papers for black and sepia tones, and "cold bath" papers for black tones.

When the printing is completed all prints should at once be taken out of the printing-frames, and immediately transferred to an empty (dry) tin with calcium chloride as "preservative," similar to that in which the paper was bought or stored after its preparation. Here they should remain until we are ready to develop, the tin being made air-tight as before.

**Development.** The development of a platinum print is at once the most important and most interesting part of platinotype manipulation. Here we can see what we are doing and control, change, or modify the results according to our desires. The method of development is the same for all *development* papers, but the formulas differ in details according to the variety of paper used, the effect required, or the kind of negative employed. With some papers, also, the developer is heated; in other cases, it is a cool or tepid solution. The "clearing" or fixing of the print is so closely associated with the development of the image that they are here dealt with together. The reader will clearly understand, however, that "clearing" is no part of the development of the print, but that the "clearing" bath simply arrests the progress of development and clears the whites of the picture by removing the iron salts from the image and its support. In developing our prints we will discover, after a little practice, that there is a slight difference in the results when we float the exposed print, face downward, on the solution; or immerse it, drawing it through the solution; or simply immerse it quickly and then withdraw it, letting it develop (picture image uppermost) held flat on the left hand for convenience of observation. The usual practice is to immerse the thinner papers in the solution, and to float the thicker papers, in each case avoiding the formation of air-bells by care in placing the print in or on the developer. Or we may apply the developer with a brush or pad of absorbent cotton over the surface of the print, laid on a sheet of glass, or thin oilcloth, or on the bottom of an empty porcelain tray. Normal developers may be used repeatedly until exhausted, care being taken to remove the scum which forms after repeated development. The used developer, of course, should not be poured back into its original bottle, but into a bottle reserved for that purpose, and labelled "Used Platinum Developer." Prolonged development, by any method, tends to cause the picture image to sink into its paper support, leaving a flat print. Developers that are diluted are more quickly exhausted than those of full strength and give warmer tones. It is well to rock the developing solution between the operations, so that any scum that has formed on the surface may be broken up, and not permitted to interfere with the next print. Air-bells should be touched with the tip of the finger previously dipped in the developing tray. The use of glycerine as a retarder in development gives the worker a wonderful aid toward controlling his final result or errors in exposure, but it needs intelligence in its handling.

The normal developer for *development* platinum papers is a saturated solution of potassium oxalate. The salt should be neutral, neither acid nor alkaline. One part of potassium oxalate dissolves in three parts of water to form a saturated solution. For some varieties of paper, especially the "cold-bath" papers used today, this solution is diluted with water or modified by the addition of other chemicals. Particular effects are also secured in this way.

Carbonate of soda has been proposed as an alternative developer in cases where potassium oxalate is not obtainable, but the latter is altogether preferable.

**Hot Bath: Black Tones.**

Let us now take up the development of "hot-bath" papers for black and sepia tones. These are two different papers, but are here connected because they require the developer to be heated, hence their name. Prepare a *stock* solution of developer by dissolving 8 ounces of potassium oxalate in 27 ounces of water. Label this *Strong Oxalate Solution*, by which name it will be referred to in succeeding pages. Presuming that we are about to develop a print made on "hot-bath" paper, we take 1 part (by measure) of strong oxalate solution and add to it 2 parts of water. This is poured into an enamel ware or porcelain tray set upon an iron plate over a small gas burner or stove, so that the solution can be heated to 160° or 180° Fahr. Use a small thermometer to tell the degree of heat. Immerse the exposed print, by subdued daylight or gaslight, in the solution at 180°, drawing it through the developer so that no large bubbles are present. After the print has been drawn through the solution, carefully examine it and, if there are any small air-bubbles press them and allow such spots time to develop before removing the print into the fixing bath, where they will have left no trace of their presence. The developer may be used time after time, but it is advisable to add more water to take the place of that lost by evaporation. It is a good plan to keep the solution up to a certain quantity. After the developer has been used a few times be on the alert to detect any deterioration in the character of the prints; when this is seen throw the developer away and use an entirely new bath of the same proportions as before. As soon as the print reaches the desired depth place it in three "clearing" baths of hydrochloric acid made as follows: hydrochloric acid, 1 ounce; water, 60 ounces. (This solution will be hereafter referred to as "Ordinary Clearing Bath.")

*Modifications of the Hot-bath Developer.*—As most amateurs—and professionals too—obtain different kinds of negatives, it is desirable to know how the developer may be altered to suit each kind of negative. *Dense Negatives.*—Slightly over-print and develop with a solution slightly colder than usual. The exact temperature can only be learned by experience, but 100° Fahr. is an average for this class. *Thin Negatives*.—Slightly under-print and develop with a very hot bath, say 180°–200° Fahr. The best way to learn how to modify the developer is to make three prints from a normal negative. Develop the first, printed as far as usual, with the developer at 160° Fahr. The second, slightly over-printed, develop with a colder solution (100°–120° Fahr.). The third, slightly under-printed, develop with a hotter solution (180° Fahr.), and make a careful comparison of the three. It will be found that the first one will lack in the darkest tones, as well as in detail in the highest lights. The second will have a softer image throughout, whereas the third will have a tendency to harshness.

**Hot Bath: Sepia Tones.** This "hot-bath" paper is similar in appearance to all other platinotype papers, but seems to be more sensitive to light, and to be more easily deteriorated by moisture than the black tone papers. Greater care is, therefore, required; indeed, unless great care is taken with it from the opening of the tin in which it is received, until the print is removed from the first acid fixing bath, the whites will have a dirty appearance which will entirely spoil the print. In using this paper the "Special Solution" prepared by the manufacturers is highly recommended. The developer is made up as follows: Strong oxalate solution, 1 part; water, 2 parts. To every 4 parts of the above add 1 part of the "Special Solution." This mixed developer will not keep, so that although a large number of prints may be developed with it when freshly made, when once used it is best to throw it away. In place of this "Special Solution," mercuric chloride may be added to the developer in the proportion of 20 minims saturated solution to each ounce of oxalate solution, and very similar results will generally be obtained. I must not omit to mention that this method is not as reliable as the use of the "Special Solution." With all the above developers, the solution must be heated to 150°–170° Fahr., and the print will take from 15 to 20 seconds to develop.

This "hot-bath" *sepia* paper may be used as a "cold-bath" paper, *i.e.*, it may be developed with a solution at the ordinary temperature, 50°–70° Fahr. The cold developer is as follows: Potassium oxalate, 30 grains; oxalic acid, 2 grains; water, 140 minims; glycerine, 60 minims. The potassium oxalate and oxalic acid must be thoroughly dissolved in the water before the glycerine is added. The glycerine must also be thoroughly mixed with the solution before used. The developer is best applied with a soft brush and if those parts which are over-printed be first covered with glycerine, or left untouched until the under-printed parts are fairly out, a very satisfactory result may be obtained from a faulty negative. After development the print is fixed in the ordinary clearing bath as given above. I may add that it is not necessary to use *sepia* paper at all, as sepia tones can be easily obtained on the "cold-bath" paper, as will be described later.

**Cold Bath: Black Tones.** This paper is developed by immersion in an oxalate solution, which may be diluted or heated to compensate for over-printing or under-printing. If the print has been printed to the ordinary depth it may be immersed in (or drawn through) the following developer: Strong oxalate solution, 4 ounces; water, 8 ounces; and allowed to remain in this solution for about one minute, when full density will have been gained. The developer may be used at normal temperature, but it is advisable not to let it sink below 60° Fahr. If the print, when immersed in the solution, is found to be under-printed, there are two ways by which sufficient density may be obtained. (1) Hold the print before a fire, turning the printed side first toward, and then from, the fire. (2) Heat the developer to 90°–110° Fahr. The raising of the temperature of the developer even a few degrees makes a decided difference in its power, so great care must always be taken. Holding the print to the fire in developing, or raising the temperature of the developer, causes the print to have a warmer tone. Many printers, therefore, preferring warm tones to the cold blacks, always print slightly below the standard and compensate for under-printing by heating the developer. This yields prints showing a brown tendency while retaining the rich black image peculiar to the process.

*Intense Blacks.*—The simplest way to obtain prints showing intense blacks, with full gradations, is to use the "D" Salts as supplied by Willis & Clements

(The Platinotype Company). If desired these can be mixed at home and will cost little, if any more, than the ordinary oxalate of potassium. Formula for "D" salts : Potassium oxalate, 6 ounces ; potassium phosphate, 3 ounces. These salts must be thoroughly mixed and dissolved in 56 ounces of water. Sodium phosphate may be used instead of the potassium if desired. The developer is formed by taking equal parts of "D" salts solution and water. *Cold, Grayish Blacks* may be obtained by adding two parts of water to each part "D" salts solution. For architectural details, interiors, or subjects possessing a wealth of delicate detail this developer is perhaps the most suitable. *Warm Stone-colored Brown Tones* may be obtained by diluting the strong oxalate solution with water in the proportion : Strong oxalate solution, 1 part; water, 2 parts, and allowing the mixed diluted solution to remain for a few weeks in an open bottle, when it will quickly deteriorate. Filter before using. The use of this "deteriorated" solution for developing suitable subjects—*i.e.*, old buildings, is productive of very effective results. *Sepia Tones*.—To obtain these tones with the "cold-bath" paper, print to the usual depth and immerse the print in : Strong oxalate solution, 3 ounces ; water, 6 ounces ; mercuric chloride, 5% solution, 1 ounce. A darker sepia tone may be obtained by heating the developer to 100° Fahr. A colder sepia tone is more easily obtained by applying the solution with a brush as described in the next paragraph. Note here that within certain limits the quantity of mercuric chloride gives a warmer image if more is added, while the image is less altered if less mercuric chloride is used. In using mercuric chloride care must be taken to avoid getting an excess, in which case the whites of the picture will be stained and a very flat image will result.

**Brush Development.** We have now seen how our prints may often be saved from failure when under-printed, by heating the developer. Let us now see whether those which are, by mischance, over-printed may be modified. The developers used in brush development are the same as those used for immersion but with the addition of glycerine. The results are also identical, so that any of the effects already described may be obtained by using the formulas as given with the addition of an equal part of glycerine, *i.e.*, to obtain sepia tones on "cold-bath" paper, supposing the picture to be over-printed, take the developer given under the caption, viz.: Strong oxalate solution, 3 parts; water, 6 parts; mercuric chloride, 1 part; making 1 ounce of solution, and add glycerine, 1 ounce. Thoroughly mix and apply with a water-color mop to the face of the print. If cold sepia tones are desired watch the image as it develops and stop, by placing the print in the clearing bath immediately the desired tone is obtained. Here note that a brush which has once been used with the mercury chloride developer should not be used afterward when black tones are desired.

*Normal Brush Developer.*—Strong oxalate developer, 1½ ounce; water, 2½ ounces; glycerine, 1 ounce. Print to ordinary density, slightly deeper than if the prints are to be developed by immersion, then place on sheet of clean dry glass and, commencing at one corner, draw the brush containing the developer gently but quickly across the paper; repeat the operation, each time dipping the brush into the developer and allowing the edge of the brush to overlap the part developed by previous stroke. When the print has been entirely covered with solution apply brush to weaker parts of print. As soon as the print has gained the required density, transfer it to the fixing bath. The action of the glycerine is to retard development, and this is taken advantage of in compensating for over-printing, in vignetting, and in local development. The most natural way to compensate for over-printing would be to dilute the developer with water, and this may be successfully done in many cases. There is one great drawback—*i.e.*, granulation of the print. A safer way is to dilute the developer as required by a mixture of glycerine and water in equal parts. It is surprising how far over-printing may be compensated by this means. It is hardly necessary to state that the development of the print must be stopped by placing it in the fixing bath as soon as the required result has been obtained. If the print is only slightly over-printed a reliable developer is as follows: Strong oxalate solution, 1 part; water, 2 parts to make ½ ounce of solution, then add glycerine, ½ ounce, and water and glycerine (mixed in equal proportions), ½ ounce. If the darkest portions of the print are "printed-out" and the negative is an even one, increase the quantity of glycerine and water to 1 ounce in the above formula.

*Vignettes* are somewhat difficult to obtain on platinotype paper, because the blacks in the image have passed through a grayish shade, and if we make a vignette with an ordinary vignetting glass, the image appears black in the centre and gray around the edges. To obtain a vignette with even gradations, print with a mask slightly larger than the image required, and use a serrated mask placed about half an inch in front of the negative. When the printing is almost completed, remove this serrated mask and allow the print to finish. Before developing, cover the part over which the mask has been with glycerine, then apply the diluted developer given below, starting at the centre of the image and carefully working toward the edges.

*Developer:* Strong oxalate solution, 1 part; water, 2 parts; glycerine, 1½ parts. If this is correctly applied, the result will be an evenly graduated vignette, especially if care be taken to blend the developer with the glycerine around the edges of the image by means of a soft brush.

**Local Development.**

The action of glycerine in retarding the development, rather than diluting the developer and so giving weak prints, may be taken advantage of in many ways for the improvement of prints from faulty negatives. This especially applies to local development, by means of which any part of the picture-image may be treated separately, with different developers according to the effects desired. In such cases the exposed print is first given an even coating of glycerine and this is allowed to soak for two or three minutes. Now, with a soft brush dipped in a solution of glycerine, 10 parts, saturated solution of potassium oxalate, 1 part, go over those portions of the image likely to print out too light. If this does not bring out the detail sufficiently, apply (with a brush) a solution of 1 ounce of glycerine in ½ ounce of potassium oxalate, and at the same time brush the parts slightly more printed with the first solution 1 : 10. By these means the developer may be applied locally without fear of lines on the print or the action of the developer spreading. Thus in printing from a landscape negative with a thin sky, the print being protected wholly or in part with glycerine, we may develop the sky portion to the density desired and hold the foreground back. The modifications possible in this way are endless and offer a delightful field for experiment.

**Moonlight Effects.** These may be obtained from a suitable negative, such as one with heavy clouds, sunset views and the like, by printing somewhat darker than usual. The print is then developed in the following bath: Strong oxalate solution, 1 part; water, 2 parts; glycerine, 3 parts. To each ounce of developer add one dram of a ten per cent. solution of ferricyanide of potassium. Development should be effected by means of a soft camel-hair brush, which must not (afterward) be used for developing either black or sepia-tone papers. The obtaining of warmer tones depends on the heat of the developer.

**Damp Paper.** Despite precautions it will sometimes happen that our stock of platinum paper will become damp. In such cases we may obtain passable prints by the following means: In each case the paper is better to have been dried in a slow oven, *i.e.*, not above 100° Fahr. *First.* Print rather deeper than usual and add a little potassium bromide to the developer, thus: Normal developer, 1 ounce; potassium bromide 10% solution, 30 minims. Neither this nor any of the other remedies will be successful when the paper has got thoroughly damp. But when only slightly damp the addition of potassium bromide or, better still, bromide water (a very small quantity), results in great improvement. *Second.* Almost print out and develop with a very weak developer, to which is added potassium chlorate. The following formula is reliable: Weak developer (of strength required), 8 parts; potassium chlorate, 10% solution, 1 part. *Third.* Add a few drops (say 10) of sodium hypochlorite to every ounce of developer. This chemical is rather difficult to get, but the solution required may be easily made in the following way: Chloride of lime, 1 ounce; sodium carbonate, 2 ounces; water, 20 ounces; filter the solution and use it as described above. This last way is perhaps the most certain way to overcome moisture in platinotype paper. *Fourth.* Abney mentions the following way to obtain the fullest effects out of damp paper (hot-bath paper): Use the developer at a temperature not exceeding 90° Fahr. Use "D" salts or potassium oxalate in development, to which potassium chloride has been added. In the latter case acidify strongly with oxalic acid ; in the other cases print the paper deeper than usual. The following is the formula which Capt. Abney recommends if ordinary potassium oxalate is used : Strong potassium oxalate solution, 1 ounce ; water, 2 ounces ; oxalic acid, 1 ounce ; potassium chloride, 24 grains. The development will be very slow for platinotype paper. The modification of platinotypes by intensification and other methods of after-treatment will follow.

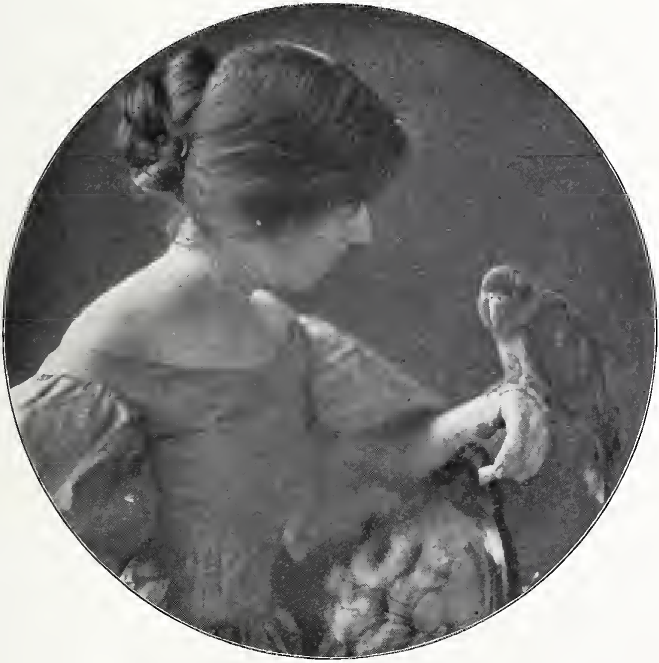
**Clearing or Fixing.** Whatever formula or method of development be used, the clearing or "fixing" bath is the same throughout. As soon as the prints are developed to the desired depth they are immersed (without washing) in a bath of hydrochloric (muriatic) acid, 1 ounce; water, 60 ounces. Some papers, such as *Platona*, are cleared in a slightly weaker solution—1 ounce acid to 80 ounces of water. Or we may use, instead, a bath of citric acid, 3 ounces ; water, 60 ounces. This acid bath does not soften the surface of the paper as much as hydrochloric acid. It is a little more expensive. Where large numbers of prints are to be cleared it is advisable to use an acid bath of double strength—2 ounces acid to 60 ounces of water. Sepia "hot-bath" paper does not require so strong an acid solution, and 1 ounce of acid in 120 ounces of water will be sufficient. The method of clearing is to use three or four trays, each containing an equal amount of acid solution. The developed prints are passed from one tray to another, remaining ten minutes in each. The first tray used will quickly become charged with iron (from the developed prints). This is indicated by its yellow tinge. It should be thrown away when the yellow color is decided in tint. If the last (third or fourth) clearing bath shows yellow, this is a sign that it also is charged with iron, and should be renewed. In these baths the prints will lose their characteristic yellow tint and the lights of the images will become pure white. It is important that the clearing of the prints should be thorough, as if any iron remains in them they will change to a disagreeable yellow in the lights and resemble faded silver prints.

When "cleared," the prints should be well washed in running water for fifteen minutes, or in four changes of clear water of five minutes each. They are then finished and ready for mounting.

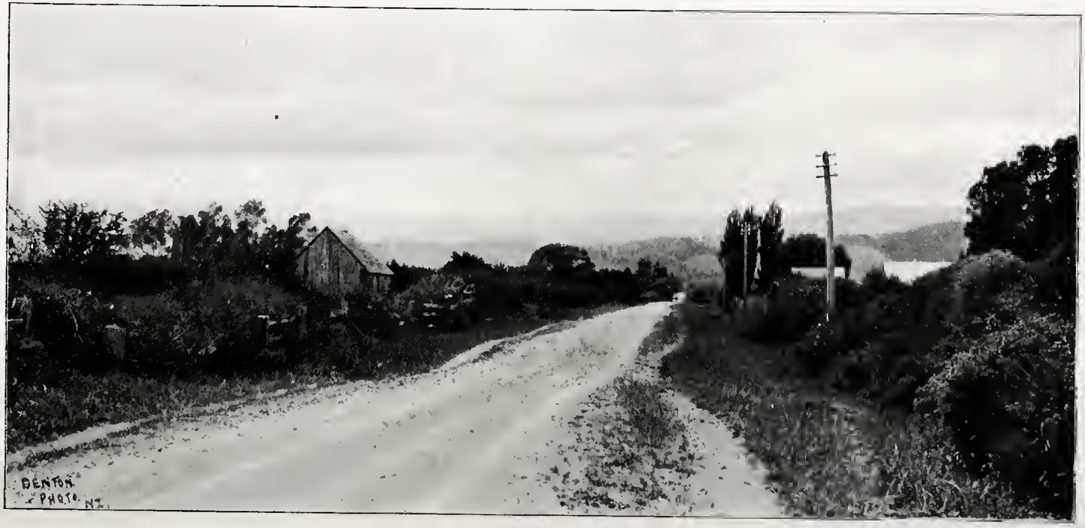
**After-treatment : Toning.** Platinum prints made on *print-out* or *development* papers may be considerably modified or changed in color or tone by the various methods of toning or intensifying which follow. Under *toning* are included formulas which alter the color of the prints ; under *intensifying* I group methods of increasing the density of weak prints rather than changing their color. It has already been indicated that the simple addition of mercuric chloride to the developer used for black-tone papers will change the tone of the prints to a warmer black or brown. Similarly the addition of one-half grain of dry mercuric chloride to the ounce of developer used with sepia paper will produce a warmer-toned print on this paper.

**Warm Brown Tones.** Some years ago, J. Packham introduced a method for obtaining warm brown tones, especially on flat, or under-printed platinotypes, by the use of what is known as *Compound Tinctorial Powder*—a refined form of catechu. I have not been able to get this powder on this side of the Atlantic, but the method is useful at times, and so I make room for it. A small quantity of the *Powder* may be easily imported through the mails. It is obtainable from Miss Packham, Katherine St., Croydon, England. An ounce will be sufficient for many experiments. The method is not applicable to prints developed by the aid of glycerine. For use, make a concentrated solution as follows : Tinctorial compound, 120 grains ; water, 5 ounces. Boil for five minutes in a Florence flask. When cold add 1 ounce of alcohol as a preservative, then make up the solution to 6 ounces by adding water. To tone, take 25 minims of this concentrated solution and add 20 ounces of water. The print is immersed in this until the desired tone is reached.

If the bath is used *cold*, the toning may occupy two or three hours ; but if the solution is heated to 130°–150° Fahr., the toning may be accomplished in less than fifteen minutes. A cold bath gives a cold brown tone, hot baths, warmer tones. If uneven tones appear, we may be sure that the print contains iron, *i.e.*, has not been thoroughly washed. After toning, the prints should be rinsed in water, dried, and are then finished. If the whites of the picture are degraded, their purity may be restored by washing in soap and water.



By Eva Lawrence Watson



THE ROAD THROUGH THE VALLEY. Frank J. Denton

*Medalled at New Zealand Inter-colonial Exhibition*, 1897, *and at Calcutta*, 1898

**Bartolozzi Reds.**

Rich Bartolozzi Red tones may be obtained on platinum prints by immersing much under-printed prints in a bath made up as follows: Uranium nitrate, 2 grains; ferricyanide of potassium, 2 grains; ammonium sulphocyanate, 1 grain; water, 2 ounces. All baths containing sulphocyanate are, however, liable to tone irregularly. Beanland gives the following formula as reliable, though not giving such rich red tones as the above: Ten per cent. solution of uranium nitrate, 1 dram; ten per cent. solution of ferricyanide of potassium, 1 dram; ten per cent. solution of sulphite of sodium, 1 dram; add 3 drams glacial acetic acid, and water to make the bath up to 6 ounces. This bath tones quickly and evenly, and if sepia paper has been used, or mercuric chloride added to the developer in making the print, very pleasing tones result. The blacks of the print gradually change to a rich sepia, then to a cold red, and finally to a red chalk color. Another good formula, which is made up in two solutions, which must be mixed immediately before toning is commenced, is as follows: A. Potassium ferricyanide, 4 grains; acetic acid, 24 minims; water, 4 drams. B. Uranium nitrate, 4 grains; acetic acid, 24 minims; water, 4 drams. This bath is most useful for very much under-printed prints. It is also a handy intensifier for negatives or lantern slides.

Still another formula is the following: Red prussiate of potash, 60 grains; uranium nitrate, 60 grains; acetic acid, 50 minims; water, 20 ounces. When all is dissolved you will find a precipitate forming; let it rest for an hour or two. For use, pour off a portion of the clear solution into your dish, immerse the print, and the action will commence in from five to ten minutes. Let it remain until it is of the color required. Wash in running water for three minutes; if you find that the whites are slightly tinged, and you do not like the appearance, wash a little longer until removed. This tingeing of the whites only happens occasionally. Pour your bath back into the same bottle, and let it settle for future use. Prints treated in this way show no change after nearly two years.

After a print has been toned with uranium it is advisable to place it for a few moments in a weak bath of acetic acid, 2 drams; water, 5 ounces. The purpose of this bath is to make the tone more permanent, as the tones obtained by uranium are very fugitive, compared with those obtained by Packham's *Tinctorial Powder*, or with platinotypes themselves. So fugitive are they, that they may be entirely washed out by leaving the prints in running water for a few hours.

Again, if the color obtained is not satisfactory it may be washed off by gentle brushing over the print with a ten per cent. solution of carbonate of soda. This is an advantage sometimes, for if the sky or the high-lights become stained they may be rendered perfectly white by carefully going over them (after the print has been dried) with a brush charged with the carbonate of soda solution. In mounting uranium-toned prints add a little acetic acid to the mountant; by adopting this means we may retain, without fading, a uranium-toned print for over four years.

**Green Image—White Ground.** Tone the print with any of the uranium-toning baths given above, the "Sulphite of Soda Bath" being preferable. When the print reaches the sepia tone lift it out of the solution and, without washing, immerse in a very weak solution of perchloride of iron (or ferric chloride). The following bath will be found very suitable: Perchloride of iron, 10 grains; water, 1 ounce. When the required color has been obtained transfer the print, without washing, to a bath of acidulated water: Acetic acid, 10 minims; water, 1 dram. Then slightly wash in pure water and dry. In mounting prints of this kind slightly acidify the mountant.

It will sometimes be found that the whites are slightly stained; they may be restored (1) by washing the print in a very weak solution of carbonate of soda—which will gradually reduce the color throughout the print, or (2) by carefully going over the whites with a stronger solution of carbonate of soda—applied by a small brush. In this latter method the print must be thoroughly dried before the carbonate of soda is applied, or else the solution will "run" and destroy the color in other parts of the print.

**Blue Tones.** These are obtained by simply inverting the order of baths. Immerse the print for five minutes in the perchloride-of-iron bath as given above. This will have apparently no effect until the print is transferred (without washing) into the uranium-toning bath, when the print will quickly assume a blue color. Of course the uranium bath is entirely spoilt for ordinary sepia and red tones by the print saturated with iron being immersed in it.

These tones are perhaps seldom required in the ordinary production of prints, being suitable chiefly for special effects, such as "Moonlight" or "Sea-scapes."

**Moonlight Effects.** Perhaps the simplest way to obtain these effects is that described on a previous page. Beanland suggests, however, another way to obtain similar effects without having resort to uranium. Prepare two solutions: A. Potassium ferricyanide, 2 grains; water, 20 minims. B. Perchloride of iron, 5 grains; water, 50 minims; hydrochloric acid, 5 minims. Mix these together and add water to make the bath up to 2 ounces.

If anyone should by mistake allow a print to become over-printed and forget to compensate for that overprinting by development, as shown in the preceding pages, I can recommend a trial of this process. It gives most pleasing results, and has the advantage of being equally workable with any of the various kinds of platinotype papers.

**Intensifying.** Sometimes it will be found desirable to strengthen or intensify the color of a platinum print. This, with *print-out* or *development* prints may be effected in various ways. Dollond's gold-toning method, which also intensifies the platinum image, is, perhaps as simple and as useful as any. The method produces the best results with new rather than old prints. The print is first soaked in water and laid flat upon a sheet of glass. An even coating of glycerine is next spread over it by means of the finger-tip. We now prepare a gold solution as follows: Gold chloride, 15 grains (tube); water, 7½ drams. A few grains of chalk are added to neutralize the solution, and then add one drop of pure hydrochloric acid. With a soft, broad camel-hair brush this solution is carefully brushed over the face of the print, so that the whole of the print is evenly covered and the solution is kept moving. The image will gradually darken under this treatment. When the desired depth of tone is reached, rinse the print in water to remove all the glycerine and sponge the print, back and front, with a mixture of equal parts of the following solutions: A. Sodium sulphite, 1 ounce; metol, 50 grains; water, 10 ounces. B. Potassium carbonate, 1 ounce; water, 10 ounces. The print is now well washed in running water and intensification is complete.

A simple *platinum* intensifier is as follows (Hubl): Prepare two solutions. A. Sodium formate, 48 grains; distilled water, 1 ounce. B. Platinum perchloride (platinic chloride), 10 grains; distilled water, 1 ounce. For use add 15 minims of each solution to two ounces of water. Immerse the print in the solution for from ten to thirty minutes, according to the amount of intensification desired. When finished wash the print in running water and dry.

Other intensifiers include the use of gallic acid and silver nitrate, pyro, hydroquinone, etc., but the two given will be found sufficient for the needs of the average worker.

**Printing on Fabrics.** The preparation of fabrics for platinum printing, and their manipulation does not materially differ from the procedure when paper is the support, except that care is needed in sizing, sensitizing, and developing, to keep the fabric free from creases. This is easily managed by stretching the fabric on a light wood frame just as we stretch a canvas for oil painting. The various solutions are applied, as evenly as possible, with a sponge. The following formulas will be found to be reliable: Two solutions are required. A. Potassium chloro-platinite, 60 grains; water (distilled), 4 drams. B. Ferric oxalate, 60 grains; water, 4 drams. A and B must be mixed in equal parts just before use, and be applied to the sized fabric, which must be dried before a fire within ten minutes after coating. The sensitized fabric must be stored in a calcium tube before use. After exposure develop on citrate of soda and water (120 grains per ounce), and then immerse in the usual acid baths. Print deeply, and warm the developer to about 150° Fahr.

This formula will not answer for silks, sateens, etc., which require different treatment. For these the prepared solutions of Willis & Clements are preferable to any formula I can offer. Or we may use the preparation called *Sensitol* and get a silver image which may afterward be toned with a platinum solution such as *Tonplatinol* or other single toner. I hear that the new print-out platinum method of Dr. J. C. Millen is also available, in a convenient form, for printing on fabrics and supports other than paper, but I have not yet been able to obtain the materials or details.

**Stains on Prints.** Despite careful working our prints will, at times, have a yellowish tinge. This is probably due to imperfect removal of the iron after development. The coloration may be removed by immersing the prints in a bath of chloride of lime 1 part, in 20 parts of water. A better solution (less injurious to the print) is the sodium-hypochlorite bath described under the use of damp paper. Here, however, it should be diluted with an equal bulk of water.

Ink-stains may be removed by applying to them a saturated solution of oxalic acid. This should be prepared with warm water, but applied cold, by means of a tuft of absorbent cotton.

**Platinum Toning.** The third method of making platinum prints is that most widely known and used in this country—the toning of silver prints with platinum. This method is applicable to all kinds of silver prints, whether printed-out or developed. In this country it is almost exclusively applied to the platinum toning of matt-collodion print-out paper, of which *Aristo-Platino* is a well-known example. At a conservative estimate I would say that more than half the total number of prints made daily in the United States at the present time are *Aristo-Platino* prints toned with platinum. In England, platinum toning is applied, in a limited measure, to gelatine chloride print-out papers, and plain salted silver papers. Properly made platinum-toned plain silver prints, and especially matt-collodion prints, are equal in delicacy and beauty to prints produced by any other method at present available.

The essential difference between platinum-toning methods and printing in platinum is that in the former we use silver, instead of iron, for the preliminary image. Practically there is no difference in the chemical action which takes place when we use silver instead of iron to produce the preliminary image, to be afterward replaced, to a more or less extent, by platinum (Abney & Clark). The production of the picture-image with silver print-out papers is so familiar that I need not here repeat it. In the well-washed, but untoned, silver print we have an image in metallic silver. In toning with platinum, the metallic silver of the image takes chlorine from the platinum salt, forming silver chloride (which, of course, is lost to the image, being removed by the subsequent "fixing" of the print in hypo-soda), and metallic platinum which is deposited upon the image. Thus we get a print in which the original image of metallic silver is in part replaced, and wholly enveloped and protected by metallic platinum. The loss of silver from the image accompanying the reduction and deposition of metallic platinum, makes it necessary to print more deeply when we intend to tone with platinum as compared with the familiar method of toning with gold. It is for this reason that we are told to use a fairly strong negative, and to continue printing until the high lights in the picture are slightly tinted, the shadows bronzed, etc., so that the tendency of the toning method to bleaching or loss in the lighter portions of the image may be compensated for. Somewhat on the same grounds it is sometimes advised, as when printing from thin detailful negatives lacking contrast, to partly tone the print with gold and follow this with a second toning with platinum. In this way the reduction of the platinum is accomplished more gradually; there is less tendency toward loss or bleaching in the details of the lights, and the print gains in richness and depth. With a negative of fair density this double toning is not essential, *i.e.*, given a rich vigorous print, the platinum image may be obtained by toning in a single bath of acidified chloroplatinite of potassium. After toning, the print is washed in several changes of water to remove all trace of acid from the image, and "fixed" in hypo-soda solution. It is then washed in running water, after which the print is finished.

**Aristo-Platino.**

Among commercial papers of this class *Aristo-Platino* deserves special mention because of its invariable uniformity and printing qualities. In the use of this paper, in which we have to deal with a delicate balance of sensitive salts, it is altogether advisable to follow closely the instructions issued with the paper, and to use the platinum-toning solutions prepared by the manufacturers for use with their paper. A copy of the *Aristo-Manual* gives the various methods of treatment in detail. The book is so readily obtainable, and so widely circulated that I need not repeat these here. Intelligently handled, this paper yields prints of great beauty, its grainless but not glossy surface lending itself to almost any desired effect.

**Plain Papers.** The preparation of plain papers for platinum toning is a subject big enough to have a book to itself, and this may be had in Clark's *Platinum Toning* to which the reader is referred. Very briefly the method is as follows: For the paper support the papers used in preparing platinum papers, already given, offer a sufficient variety. Instead of sizing only, however, we need to "salt" as well as "size" them. This is generally accomplished by immersing the dry arrowroot-sized paper in a solution of: Sodium chloride *crystals*, 150 grains; ammonium chloride, 100 grains; potassium bichromate, 4 grains; water to make up to 20 ounces. In this bath the paper is allowed to remain from three to five minutes, according to thickness of paper, and then hung up to dry. In this condition the paper will keep indefinitely and may be sensitized as needed for use. For sensitizing, float the paper for two minutes on a bath made up as follows: Silver nitrate, 1 ounce; citric acid, 150 grains; distilled water to make 8½ ounces. In floating, lay the paper on the solution gradually from the centre, letting each end of the sheet meet the surface of the solution in a continuous movement. In this way air-bells may be avoided. After sensitizing, suspend the paper (now sensitive to light) by one corner until surface dry, then hang it over a line until dry, when it should be stored flat and kept under pressure. *Clemons' Salted Paper* is a reliable paper, obtainable commercially, and already prepared for sensitizing.

The prints on such papers must be deeply printed, until the lights are slightly tinted. They are then washed in several changes of running water to remove the free silver, after which they may be toned in a bath made as follows: Potassium chloro-platinite, 5 grains; sodium chloride, 50 grains; citric acid, 50 grains; distilled water, 30 ounces. Add ½ grain of chloro-platinite of potassium to this bath for each sheet 20 × 26, of paper toned to keep it up to the requisite strength. Judge of the progress of toning by transmitted light, and when all the red tint has left the deepest shadows, wash the print in several changes of water, beginning with a bath containing half an ounce of sodium carbonate in forty ounces of water. This renders the prints slightly alkaline. When well washed, and free from all acid, they are transferred to a fixing bath made up as follows: Hypo-soda, 4 ounces; sodium sulphite (neutral), 2 ounces; water, 40 ounces; and carbonate of soda, ½ ounce. Instead of this latter we may use 1 dram of stronger ammonia water. The prints should remain in the fixing bath, kept moving and separated, for from ten to fifteen minutes, after which they should be well washed in running water for an hour. Their permanency will depend upon the thoroughness of the toning of the image, and the complete elimination of the hypo-soda by washing.

This brings us to the end of our survey of platinum printing processes. Much more might have been said, with possible profit, on almost every point mentioned, but I have tried to include all the information necessary for an understanding of the various methods and their intelligent use. Cordial acknowledgment is made of the help given by the Rev. Joseph Beanland in the notes on the treatment of *development* papers and throughout the book. To those who desire to follow up any special process further, the following books will be found useful:

## BOOKS.

*Platinotype: Its Preparation and Manipulation.* By Captain Abney and Lyonel Clark. 1898. 173 pp. This is the most comprehensive as well as the best book on the subject from the technical point of view. It deals fully with the making of the various kinds of paper, variations in treatment, etc. $1.25.

*Platinotype Printing.* By A. Horsley Hinton. 1899. 92 pp., with prints showing how to judge exposure. A little book devoted to the use of Willis & Clements' (or The Platinotype Company's) papers exclusively. Written from the view-point of the worker in pictorial photography. 50 cents.

*A Handbook to the Platinotype Process.* By W. J. Warren. 1899. 89 pp., with prints illustrating exposure. Mr. Warren is an acknowledged master in platinotype printing, and his book is clearly written and practical. 50 cents.

*Platinum Toning*. By Lyonel Clark. 1897. 95 pp. This is the standard work on the subject and full of suggestive as well as practical information. Unfortunately for the American worker it says little or nothing about the platinum toning of matt-collodion print-out papers, universally used on this side. 50 cents.

For the student or manufacturer, or for reference purposes, Dr. Eder's *Lichtpausverfahren die Platinotypie*, just issued by Wilhelm Knapp, Halle, Germany, at 3 marks, is *the book* of books on this subject. It is, of course, available only for readers of German.

# NOTES

The November number of THE PHOTO-MINIATURE, dealing with *Photography "At Home,"* will be ready early in December. It will contain a complete account of all the branches of photographic work which may be attempted at home during the winter days or evenings, when photography out doors is not possible or, it may be, not desirable. Choice examples of "At Home" photography by Catharine Weed Barnes Ward, H. H. Pierce, Clarence H. White, R. H. Furman, and F. T. Aschman will illustrate the text.

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We must trust to the patience of our readers in these repeated delays in the publication of THE PHOTO-MINIATURE, which we are making every effort to overcome. It would not be at all difficult to get the magazine out on time, if we were not so hard to please in the matter of its quality. But, as several discriminating critics have discovered, there is much hidden work in the making of THE PHOTO-MINIATURE.

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A Japanese reader of THE PHOTO-MINIATURE suggests that it would be desirable to know something more about the pictures illustrating the magazine and their makers than is given in the title matter. Wherefore he suggests a dissertation, monthly, on "Our Pictures." The suggestion is one which we do not care to adopt. It is difficult to prepare such an item monthly without falling into general and gross flattery, as may be seen by consulting the "Our Illustrations" column in other magazines. Nevertheless, for once, we will indulge that far-away correspondent's desire for information. The frontispiece of this issue has, of course, no pictorial value in its present form, being used merely to show certain stages in the making of a platinotype print. It is from a negative by Mrs. Catharine Weed Barnes Ward, formerly an American amateur of note, now the wife of H. Snowden Ward, and with her husband, joint editor of *The Photogram*, London. The scene is an English village in some way connected with Shakespeare.

* * *

Of the other illustrations, that of the lady and the parrot is from the Philadelphia *Salon*, and was made by Miss Eva Lawrence Watson, a "new school" professional photographer whose work shows many rare qualities. The *Lydia* poster by Allan Drew Cook, also from the *Salon*, is interesting as a clever simulation of the typical Cheret poster, but was made direct from life and printed from an untouched negative. The New England harbor scene is from a negative by Mr. W. C. Paul, a professional worker whose personality and pictures are alike interesting to those familiar with them. We saw the picture and fancied it, apart from its pictorial quality, because it exemplified the advantages of isochromatic plates (Cramer's) where correct tonality and harmony are sought for. *The Quiet Valley* is the work of Mr. Frank J. Denton, of Wellington, New Zealand, an amateur whose pictures have won much praise at colonial exhibitions. The picture seemed to contain much worthy of preservation and so was reproduced for our pages.

* * *

The annual exhibition of the Royal Photographic Society, London, closed its doors November 11th, after a most successful run of six weeks. The pictorial section embraced 368 exhibits from British amateurs and professionals, and from the United States, Italy, Austria, France, and India. The standard of quality in the work shown was distinctly higher than in some years past, and the exhibition was peculiarly strong in portraiture. The American exhibitors were Alfred Stieglitz, New York (Medal); Dudley Hoyt, Rochester, N. Y. (Medal); John Beeby, W. A. Fraser, R. Eickemeyer, Jr., of the New York Camera Club; and Miss Mathilde Weil, of Philadelphia. This is a smaller representation than America has had in past years, but carrying away, as it did, two of the nine medals awarded, we have reason to be satisfied in the matter. Mr. Stieglitz secured his award for a vignette in two colors by the modified platinotype method introduced some time ago by Mr. Jos. T. Keiley and himself. Mr. Dudley Hoyt is a professional who studied his art, we believe, with Mr. Pirie MacDonald, of Albany. His medalled exhibit was generally pronounced, says the *British Journal*, to be the portrait of the year. The catalogue of the exhibition was beautifully illustrated with six full-page reproductions of selected exhibits. American work is represented in this series by John Beeby's *Wet Foggy Day in New York*—a capital bit of out-door photography.

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PHOTOGRAMS OF THE YEAR 1899.—*A Pictorial and Literary Record of the Best Photographic Work of the Year*. Compiled by the Editors and staff of *The Photogram*, 192 pp. text; 185 engravings. Paper covers, 75 cents (postage 15 cents); cloth bound, $1 (postage 18 cents). Tennant & Ward, New York. London: Dawbarn & Ward, Ltd.

Unmistakably the photographic picture-book of the year. Such is the first thought on glancing through this superb volume, and such the last thought with which one lays it aside after a careful perusal of its almost 200 pages. The scope of the book—the field awaiting such a yearly record—was abundantly apparent when the first slender volume of the series appeared in 1895. But we were hardly prepared for the remarkable development evidenced in the new volume under notice. Wherefore, a word of hearty congratulation to all concerned in its conception and preparation, upon a good work achieved, accomplished.

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A word of explanation is necessary for those unacquainted with previous volumes of *Photograms*. *Photograms of the Year 1899* is, first of all, a thoroughly well written and cleverly illustrated review of the present position of pictorial photography throughout the world. The best pictures of the year from Great Britain, America, France, India, and Australasia are here reproduced in half-tone, and reviewed in detail by men peculiarly competent to handle so delicate a task. Then, again, the volume is a complete guide to, or souvenir of, the two great British exhibitions—the " Royal,"

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and the *Salon* of the Linked Ring. Not only are the most interesting pictures of these shows reproduced separately, but the very walls of the exhibitions are pictured, showing the arrangement and position of exhibits as seen in a personal view. In this way the exhibitions are brought home in a vivid fashion to thousands who cannot visit them in person. The text is clear, the pictures representative; the volume as a whole is simply irresistible, indispensable indeed to everyone who would keep in touch with the progress of photography as a pictorial art.

◆

The interest of the book tempts us to forget the limits of our space, but a few words must be said of the American section. There is a cordial recognition of the growing importance of American photography in the fact that the critique on *The American School* by Joseph T. Keiley is given the place of honor. This section covers 21 pages, including many full-page engravings from photographs by Zaida Ben Yusuf, Gertrude Kasebier, F. Holland Day, A. Stieglitz, Clarence H. White, R. Eickemeyer, Eva Lawrence Watson, John Beeby and others. Mr. Keiley is always interesting and writes from a full experience. His estimate is in the main just, cleverly worded, and full of information. But, if we may pick a flaw in work so perfect, Mr. Keiley needs to enlarge his horizon. The American school is bigger and broader than he sees it, and we must appeal from Mr. Keiley ill-informed to Mr. Keiley well-informed. This especially with reference to the opinion that: "As far as professional photographers are concerned—excepting those mentioned (Weil, Watson, Kasebier, Hollinger, and Ben Yusuf)—there seems little chance of any change for the better among them." There is, indeed, more than a chance of change among them. The New Spring has arrived and great changes are taking place among American professionals. The last Celoron exhibition, lamentably incomplete as it was, held sufficient to wholly refute the notion that the American professional is hopeless. Nay, if the art of portraiture lies in characterization, in the individual interpretation of the subject, then surely American professional photographers, judged by their best, have no need to stand rebuked, nor be ashamed before the goodly company

# *Etching Matte*

A Platinum Paper for Art Effects

THIS PAPER IS PRINTED and THEN SIMPLY DEVELOPED IN WATER. IT GIVES EFFECTS WHICH ARE AS RICH AS A RARE OLD ETCHING

Made Solely by THE J. C. MILLEN MANUFACTURING CO.,—Manufacturing Chemists, DENVER, COLORADO, U. S. A.

named by Mr. Keiley. Apart from this slip the *critique* is full of good and we commend it alike to ambitious and unambitious portraitists as a source of inspiration.

❧

The critique on *Artistic Photography in France* is by Robert Demachy, and, as a matter of course, is charmingly illustrated. A. C. R. Carter's review of the Two Great Exhibitions offers many new view points and suggestions, as well as much helpful criticism. Of the pictures it is impossible to speak in detail, and we must leave them to the reader. A better or more delightful occupation for a quiet afternoon could not be imagined.

❧

Self-toning paper and the "Trust." Mr. Hermann Bauer, Montclair, N. J., sole agent for *Self-Toning Paper*, asks us to announce that where users of this popular printing paper cannot obtain supplies from their local dealer, orders may be sent to him, or to the factory at Newark, N. J., where they will receive prompt and careful attention. The *Self-Toning Paper Manufacturing Co.* also announces a new printing material, *Self-Toning Linen Fabric*, with advantageous features.

❧

During the entire period of the Paris Exposition of 1900, professional and amateur photographers will be afforded every facility for photographing within the Exposition and its grounds, upon payment of a registration fee of ten cents for each camera used. This does not permit of the photographing of private exhibits, for which special permission will be necessary.

❧

Several correspondents have suggested that it would be interesting to print beneath the illustrations in THE PHOTO-MINIATURE particulars of the lens and plate used, details of exposure, etc. This is not possible. The men and women who make *pictures* will rarely, if ever, give details of their manufacture. We may, however, answer inquiries concerning the pictures in the issue devoted to *Orthochromatic Photography* by saying that all the illustrations except two were made on *Cramer Isochromatic Plates*.

# THE GOERZ

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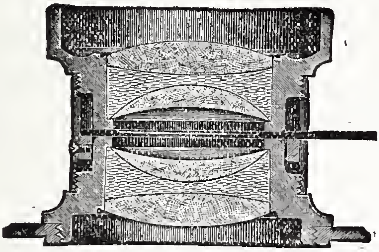

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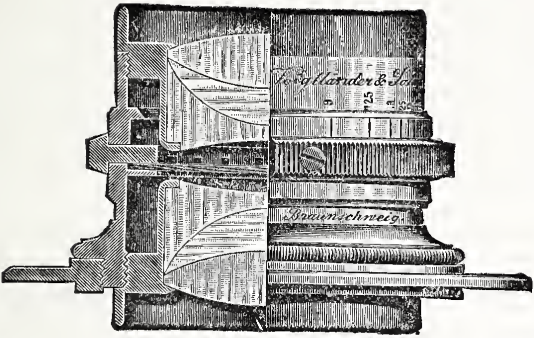
❧

The event of the month was the opening, at Philadelphia, October 22d, of the second annual *Photographic Salon*, held under the joint management of the Pennsylvania Academy of the Fine Arts and the Photographic Society of Philadelphia. It is, of course, quite impossible to give more than the briefest notice of the exhibition within the limits of these *Notes*. Those interested will find illustrated reports in the Philadelphia *Press* of October 22d, and the *Ledger* of October 23d. The official catalogue, with its fine half-tone reproductions of some of the pictures, should also be seen; it can be obtained by sending twenty-five cents to the Academy officials.

❧

To put the matter into a few words the *Salon* was the most remarkable exhibition of pictorial photography thus far held in America. The most interesting fact about it was that the American work was fully equal to the best sent from Europe, and was, at the same time, distinctive and original. Of the 360 pictures accepted, and hung, out of 1,200 submitted, 160 were by members of the jury of selection and European workers. These were given place on invitation, not being judged; to the other 200, therefore, belongs the honor of having passed the critical judgment of the jury of selection published in our July number. The exhibition represented the work of 119 exhibitors, of whom 32 were English, 3 from Scotland, 6 from France, one each from Canada and Italy, 5 from New York, 29 from Philadelphia, and 45 from various parts of the United States. The display



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was, therefore, fairly representative, although we were disappointed to find nothing from Germany, Belgium, and Austria, countries boasting a large number of skilful workers in amateur and professional photography.

◆

The pictures of the lady and the parrot and the Lydia poster, by Miss Eva Lawrence Watson and Allan Drew Cook, respectively, presented in this issue, were shown in the Philadelphia collection. The exhibition indicated that amateurs are giving more and more attention to portraiture, with highly gratifying results. There were fewer pictures of the class generally dubbed "freaks," and the exhibits showed serious purpose and a growing appreciation of simplicity. The printing process most favored was platinotype, many prints being made on sepia paper or "toned" to give color effects. The collection of gum-bichromate prints was especially interesting. This method seems to gain in popularity among photographers seeking individuality in their work. The *Salon* was well attended and the movement it represents may now be regarded as firmly established.

◆

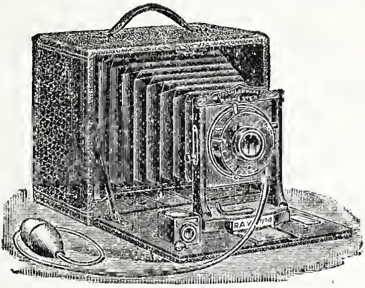
The new Bargain List issued by the N. Y. Camera Exchange, 41 Fulton Street, New York, is unusually rich in attractive specialties at reduced prices, and should be seen by city and out-of-town buyers. This enterprising firm has now three branch stores, stocked with every requisite for amateur photography, and, what is equally important, managed by men who have good sense and a kindly disposition to advise buyers in securing the best advantage when purchasing. We have found the East 23d Street branch, in the Y. M. C. A. Building, a very satisfactory shopping place where careful service and reasonable rates are necessary.

◆

*The Process Year Book for 1899* (*Penrose's Pictorial Annual*). An illustrated review of the graphic arts. Edited by W. Gamble. 175 pp., 55 full-page supplements in color and half-tone. $1.50, post free. Published by Penrose & Co., London and Paris. Tennant & Ward, New York, American agents.

To those familiar with previous volumes of this sumpt-

# RAY CAMERAS



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uous year-book, the announcement of a new volume will be sufficient. For those who are not yet acquainted with its many attractive features, we may explain that this is a yearly review of the progress of reproduction methods; a gathering together into one volume of examples by the new photo-mechanical processes of the year, with a collection of practical papers on process work by the leading authorities of this country and Europe. The result is a book which is eagerly sought for, not only by people directly engaged in the graphic arts, but by picture-lovers everywhere. The present volume, in addition to its 40 odd interesting papers, contains over fifty supplements in photogravure, collotype, three- and four-color and monochrome, together with 78 illustrations in the text reproduced from selected photographs. The book is printed on coated paper, and well bound in cloth covers with a special design. It should find an honored place on the book-shelf of every process-worker as an exemplar of his art and a record of historical value.

❧

The J. C. Millen Mfg. Co., Denver, Colo., sends to our table a number of prints showing the pictorial capabilities of *Etching Matte*, a new platinum printing paper originated by this firm. The prints are of a rich brown or sepia tone, similar to the *Copley Sepias* seen at the art stores.

*Etching Matte* comes at an opportune time and will, we believe, speedily win a wide popularity. Its manipulation is as simple as the making of a blue print, and the prints are most attractive to the eye. The image prints-out under the negative and enables one to quickly and with certainty determine the depth of the print; it is developed in water, and finished by immersion in acidulated water and a slight after-washing. Dr. J. C. Millen, the head of the new corporation making the paper, tells us that *Etching Matte* is the result of some ten years of experiments, from which, with our experience in the use of other Millen specialties, we are confident that the new paper will fulfil all reasonable requirements.

❧

An Album of War Pictures. The following interesting report of the progress made by the Government in the collection of photographs illustrating the late

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are now so easily obtained as to make them *superior to glass plates* for out-door photography. The lights and shades of the clouds are as essential to art as the landscape itself, and ordinarily far more difficult to produce, but our new films being remarkably true in the rendering of color values, put into the hands of the photographer the means of obtaining the most delightful pictorial effects without resorting to double exposure or the use of a color screen.

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Spanish-American war is extracted from the annual report of the Adjutant-General, just published:

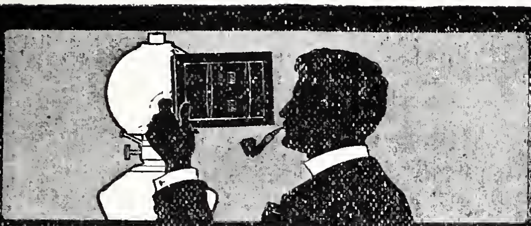
"In reply to a circular dated December 12, 1898, sent out from this office to officers and men carrying cameras during the war with Spain, there have been received over 500 negatives and 300 prints of Porto Rican subjects, over 700 negatives and nearly 400 prints of Cuban and reserve camp subjects, and nearly 150 negatives of Philippine subjects, from which something like 350 Porto Rican, nearly 500 Cuban and a few Philippine subjects have been chosen to make the final selection for an album, and these negatives and prints were then returned to their owners. There are still on hand from which to make further selections over 200 Porto Rican negatives, 350 negatives and nearly 700 prints of Cuban and reserve camp subjects, and over 600 Philippine prints.

"The work so far has been to make selections from the negatives and prints sent in, which are usually very small. The ones selected are then enlarged to the size of eleven by fourteen inches. After having collected and enlarged everything desirable, it is the intention to retouch these enlargements and then make negatives from them for the purpose of making the final pictures. This is necessary on account of the small size of the negatives and prints received, and on account of the poor quality of most of them, as they have been taken under disadvantageous circumstances, often by persons inexperienced in the handling of their cameras, and at times under circumstances when it would have been impossible to have taken any other kind of pictures. After as much material as can be obtained has been gotten together, the final compilation will be made.

"This work is regarded of importance, having already served to determine disputed questions. It is thought that in time the collection will be of such value as to induce the Congress to publish the same for distribution to libraries throughout the country."

❧

*The Photographers' Copyright League of America* is an association organized for the protection of the photographer's rights in his work, as far as its reproduction is concerned. The League has been in existence for some years, and has already accomplished much good



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work, beneficial to all who make pictures. Its work deserves the co-operation and support of every photographer who believes that his pictures possess any value, and who, consequently, desires to control their reproduction. Those who desire to join the League may do so without fee or charge, by sending their request to be enrolled as members to the secretary, Mr. Charles E. Bolles, 244 Fulton Street, Brooklyn, N. Y. We counsel the readers of THE PHOTO-MINIATURE to lend their assistance to this good work.

❧

Among the few wide-awake camera clubs of the West, the Colorado Camera Club, Denver, of which Major Wm. Cooke Daniels is president, is conspicuous. A feature of its winter work is a course of practical talks on every-day amateur work. Another interesting fixture is the annual exhibition, which will be held early in December. The three best pictures sent to this exhibition, which is open to members of clubs in Colorado, Wyoming, Montana, Utah, Idaho, Kansas, New Mexico, and Arizona, will be awarded cash prizes of $40, $20, and $10 respectively. This effort to encourage amateur photography in the far West deserves recognition. The prizes are the gift to the club of Major W. Cooke Daniels.

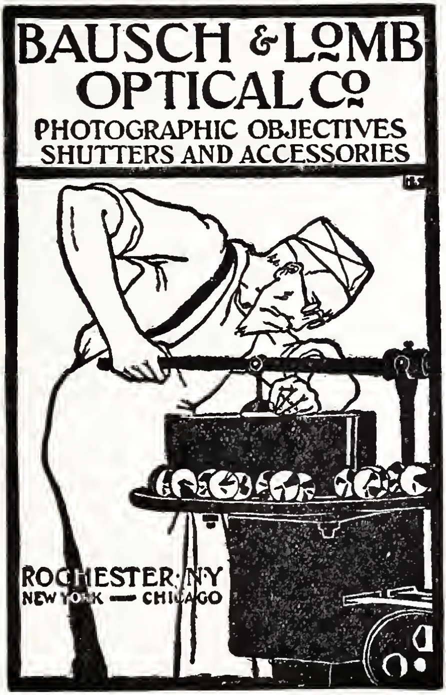
❧

An exhibition of photographs of flowers, by Mr. J. Horace McFarland, was recently held at the Y. M. C. A. Building, Harrisburg, Pa. Mr. McFarland is a specialist in floral photography and his work shows exquisite delicacy in technique and arrangement. An extra feature of the exhibition was a collection of views (26) embracing some forty miles along the Connecticut River, from Springfield, Mass., to Portland, Conn., used as a highway for more than 200 years.

❧

We will be pleased to send our new catalogue of photographic books to any reader of THE PHOTO-MINIATURE desiring a copy. This list embraces all the best American and English books on photography, and forms a valuable bibliographical reference. Tennant & Ward, 289 Fourth Avenue, New York.

ART CATALOGUE



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A limited company has been incorporated in England, under the title *Secco Films, Ltd.*, to manufacture and sell the Secco film invented by Dr. O. Moh, of Gorlitz, Germany. Among those who are able to form a reliable opinion in the matter, these Secco films are destined to play an important part in photography during the coming years, hence the readers of THE PHOTO-MINIATURE should be informed concerning them. The chief features of the invention are (1) a preparation of the surface of paper so that the sensitive surface adheres closely to it during exposure, and so that the finished negative may be readily stripped from it after being dried, and (2) the use of a strengthening film whereby a negative is obtained enclosed between the waterproof coats. In the preparation of the support and enclosing film nothing is used which can act injuriously upon the sensitive emulsion. Among the advantages claimed for Secco films are the following: They can be manufactured and sold at less than the cost of glass plates or other films; they are very light, thus 12 glass plates, 5½ × 7 inches, weigh 2½ pounds; 12 celluloid films of the same size weigh 1¾ ounces, and 12 Secco films weigh ⅓ ounce. They are claimed to be durable, unbreakable, and not easily torn. Sixty films occupy the same space as a box of glass plates. They are neither explosive nor combustible, and are as easily manipulated as glass plates or other cut films; they are extremely sensitive to light, as none passes through the support during exposure; are exceedingly thin, so that they can be printed from on either side; require no varnishing and are damp-proof; lie flat and do not curl; do not give the effect of halation; are not subject to electrical markings or spots, and during drying are impervious to dust, the attacks of insects, etc.

This is truly a remarkable series of claims, and since Secco films have been tested and found to "fill the bill," we do not wonder at hearing that applications for shares fairly flowed in as soon as the prospectus of the company was announced.

❧

The Detroit Camera Club announces its third annual *Photographic Salon*, to be held at the club rooms, from November 25th to December 3d. In the selection of pictures for the Salon, "Technique will not receive great

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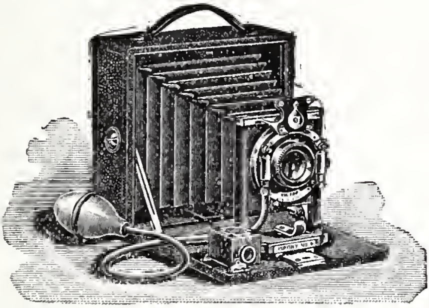

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consideration," but a general exhibition will be held at the same time for pictures "not of sufficient excellence to entitle them to be hung in the Salon." This announcement is certainly calculated to reconcile salonists and anti-salonists. Particulars may be had from W. Winckler, 106 Miami Avenue, Detroit, Mich.

◆

The English photographers certainly seem able to obtain value for their money. Three years ago the South London Photographic Society arranged a week's outing for a number of its members, and the experiment was so successful that it has been repeated annually. This month the Society intends to visit Belgium, and will be travelling for a week of nine days—that is from Saturday to Monday. Belgium is always considered a happy hunting ground of the pictorial photographer; and the South London Society has made a very happy choice. The "value" referred to is apparent when we say that all charges, including transportation by land and sea, and hotel accommodation, are less than $20.

◆

From exhibitors at the recent exhibition of professional work at Celoron we have heard several complaints about the lighting of the gallery. It is certainly exasperating to see a delicate print almost lost in a subdued light, or to see a bold one appear hard under a cruelly brilliant light. But the evil, though a real one, is one which cannot be avoided as long as pictures are hung side by side in hundreds. There is no doubt that in theory the lighting of a picture may make or mar it as much as does the mount or the frame, but this theory can only be considered when a photograph is specially prepared to hang in some chosen position. The questions of lighting and hanging have troubled artists for years, and at almost all exhibitions many pictures are hung so low, or so high, that they cannot be seen. In many galleries of paintings, too, the pictures are glazed, and the glass throws such distracting reflections that it is impossible to see the pictures. It is very easy to make complaint; but not so easy to suggest a practical remedy.

◆

At the British Convention, which was held during July, Mr. W. Crooke referred to the necessity of curb-

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ing the "snap-shotter." The New York papers, too, during the recent quiet weeks when "copy" has been scarce, have given prominence to the fact that a well-known millionnaire attacked a party of camerists who endeavored to obtain a snap-shot of himself and his wife. It is very true that the hand-camera's power is occasionally abused, but we fear that if the majesty of the law were invoked against it the result would scarcely be satisfactory. The wonder is, not that bad taste is occasionally shown in the matter, but rather that, considering the enormous number of photographers, the causes of offence are so very few.

❧

George E. Mellen, Times Building, Chicago, Ill., styled "expert," has written a clever little book entitled *New Pointers for Amateurs*. J. C. Millen, M.D., manufacturing chemist, Denver, Col., styled "specialist," makes various lines for the comfort of amateur (and other) photographers. When we spoke appreciatively (page 315, September issue) of "Mellen's clever little pocket-book," we unwittingly directed a stream of postal cards to Denver, Col., much to the bewilderment of J. C. Millen, M.D.

After several days of wonderment, J. C. Millen, M.D., received a card mentioning THE PHOTO-MINIATURE. He thereupon re-read his magazine until reaching page 315, and then advised us: Now first, George E. Mellen does not want postal cards, because his book costs fifteen cents (and is well worth it); second, J. C. Millen, M.D., "specialist" is not George E. Mellen, "expert;" and, finally, our thanks are due to the unknown friend who "mentioned THE PHOTO-MINIATURE."

❧

Congratulations to the readers of *The Photographic Times* upon the appointment of Mr. J. C. Abel to the editorial chair. It will not be an easy task to overtop the brilliant record of Mr. Walter E. Woodbury during the past five years, but Mr. Abel promises a very live magazine. His efforts will be watched with much interest and with all good wishes.

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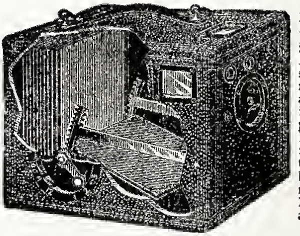

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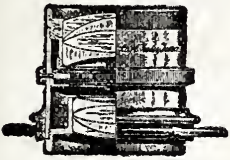

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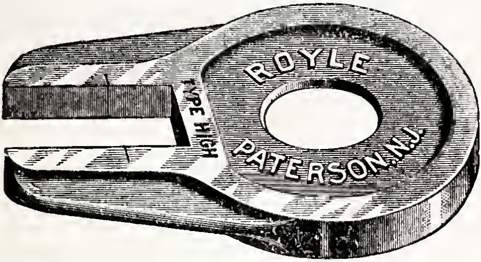

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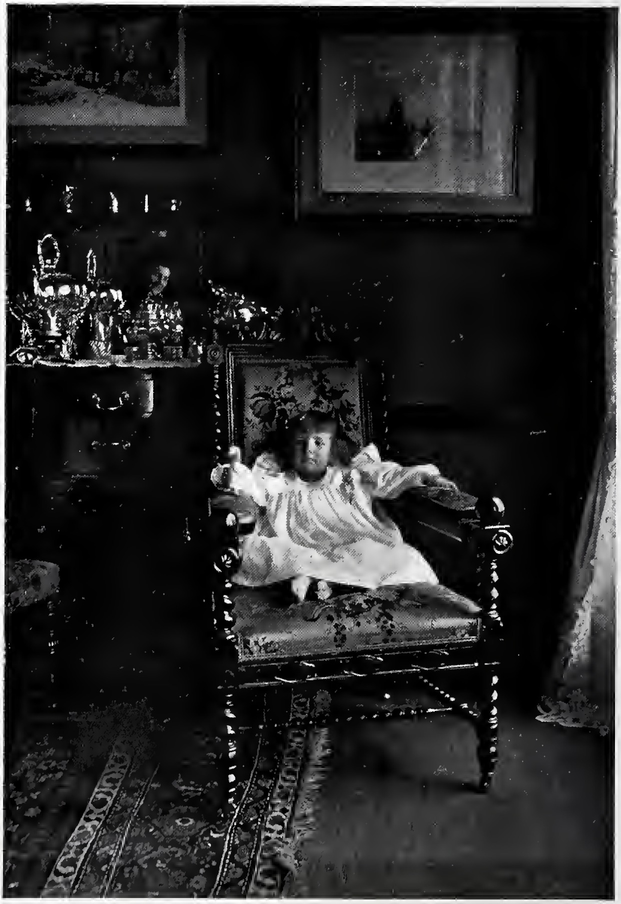

THE DAUGHTER OF THE HOUSE
Catharine Weed Barnes Ward

THE PHOTO-MINIATURE
*A Magazine of Photographic Information*
Edited by John A. Tennant
Vol. I NOVEMBER, 1899 No. 8

# PHOTOGRAPHY AT HOME

To the majority of amateurs, photography, like the wheel, is a hobby to be ridden only on fair days and in pleasant weather; or it is thought of chiefly as a means of securing records of places and things seen during tramps abroad. But it is more than this, and those who follow photography merely as a summer pastime know but the half of it. The simple purpose of this number of THE PHOTO-MINIATURE is to tell something of the other half; to set forth, in a plain and practical way, what the amateur should know about photography at home, and its possibilities for the enlivening of the dull days or long winter evenings.

It has always seemed strange to me that, among the hundreds of books published for photographers, there should be less than half-a-dozen dealing with photography as a home craft. Amateur portraiture, photography by artificial light, the photographing of interiors, still life and subject pictures, flowers and fruit, copying and enlarging, lantern slide and transparency making, printing by development and kindred methods, with the innumerable applications of photography in decoration; all these are essentially home arts, and well within the capabilities of the average amateur equipment. Hence this attempt to make a little book about some of them.

More than this, I have long desired to interest the stay-at-homes, our womenfolk, in the gentle art of making pictures of that world wherein they hold the chief place. Who so well fitted as they, in patience and opportunity, to picture that supremely interesting panorama of life of which the home is the theatre! It is a world sadly neglected by photographers, but abounding in the most delightful picture material. The children at their play, the rooms which echo with their merry laughter, the toy corner where the mimic general, the rag doll, the grizzly bear and the woolly lamb, with a thousand other curios, are so tenderly laid away when bedtime comes. The master of the house enjoying a quiet smoke, the grandmother nodding in her easy-chair, the music lesson and little social gatherings—all these are simple subjects for the camera at home, full of pleasure in their interpretation, and afterward.

Beyond these things are the more prosaic business possibilities open to women well informed and skilful in the practice of photography. It is true that these possibilities have been all too glowingly enlarged upon by certain writers for the press, but they are not to be too lightly passed over. The first place in American portraiture to-day is held by a woman who, but a few years ago, began the practice of photography at home as an amateur. It is needless to remark that success of this sort results only from long and thorough experience in a special line of work, and it is equally obvious that photography at home offers peculiar advantages in the gaining of this experience at odd times and in leisure hours.

Let us begin with the understanding that photography at home presents no difficulties which cannot be overcome by ordinary intelligence, a little contrivance, and a few helps here and there. At first we may content ourselves with such apparatus as we already possess. Later we will see that special aids are desirable for special kinds of work, and that certain commercial conveniences are useful, and well worth their cost as saving time and labor. These we will discuss in their proper place. The one thing essential is a thorough knowledge of the conditions peculiar to photography indoors, and this will be our first consideration.

**Light Indoors and Out.** Accustomed to working out-of-doors during the bright days, the amateur's first difficulty in attempting photography of any kind at home is to realize the immense difference between the intensity (photographic power) of light indoors and out. After making an exterior view with an exposure of $\frac{1}{25}$th of a second, it is incomprehensible that, coming indoors to photograph a well-lighted room, one must multiply the out-door exposure hundreds of times to get a satisfactory negative. This is why at-home photographs are, usually, so wofully under-exposed, so lacking in gradation, and so excessive in their contrasts. There is so much light out-of-doors, and it is so widely diffused; indoors the illumination is so unequal, and its distribution so unsatisfactory. The eye readily accommodates itself to the wide difference between this and that; the lens and plate, on the other hand, are painfully exact in their statement of it.

The first step toward success, therefore, must be to familiarize oneself with the altered conditions of illumination. We must know how light acts when confined, as in a room; and how feebly it penetrates the shadows thrown by objects in its path within a circumscribed area. This is the bottom problem in all photography indoors, whether we use daylight or artificial light. When it has once been mastered, everything else will be easier, and our percentage of failures will be materially lessened. This familiarity must come by observation and experience—well-worn advice, perhaps, but very much needed, as the average at-home photograph tells us. The simplest way to get this experience is to make a series of interiors of the home and, as a contrasting example, an exterior view of the house. This will teach us many things worth the knowing. First, however, let us see what may be learned by observation alone. An actinometer will be helpful, in fact, it is an indispensable aid in all indoor work with the camera. Lest the strange name make the novice fearful, I hasten to explain that an actinometer is simply a little instrument which measures the actinic (photographic) power of the light.

Exposure meters, which most amateurs know about, are actinometers, fitted with scales or tabulated figures applying what the actinometer says to give the exposure required under certain conditions, with this or that plate and lens aperture. These exposure meters save considerable time and prevent failures. Every amateur should possess one, and will be richer when he is familiar with its purpose and practical use.

**An Actinometer.**

A simple actinometer may be made at home for experimental purposes. To make it, procure a few 4 × 5 inch pieces of slow bromide paper. Immerse each sheet for five minutes in a ten per cent solution (45 grains to each ounce of water) of potassium nitrite (not *nitrate*). This should be done by lamp or weak gaslight, and the paper dried in darkness. When dry, cut the sheets up into strips one quarter by three inches, and store them in an air-tight box, such as the tin tube in which platinum paper is sold. Expose one of the strips to diffused daylight until it darkens to a slaty-blue color, and match this with watercolors on a piece of white paper. This will form what is known as the *standard tint*. Now get a piece of thin white glass, and a piece of cardboard, each one by three inches. At each of the four corners of the card paste narrow strips of thick paper, so that the card (when, later, attached to the glass) is slightly separated from it except at these four raised corners. Across the top of the card, paste a piece of the standard tint about one-half inch wide. Fasten the card and glass together with black needle paper so as to exclude all light, but leaving the ends open. Cut an opening one quarter by three quarters of an inch through the black paper at the top of the glass, so as to show the standard tint beneath. Now slip a strip of the sensitive test paper through between the card and glass until it meets or crosses the standard tint, and the actinometer is ready for use.

**Using the Actinometer.** If we expose the actinometer to diffused light (at a window), the sensitive test paper gradually darkens until it matches the standard tint. By noting, with a watch, the time required for the paper to reach the standard tint in color, we get a figure in seconds or minutes which represents the *actinometer time* of the light at that hour and in that place. In this way we measure the intensity of the light. If we compare this actinometer time with the time required to get the standard tint in another place, where there may be more or less light, we get a definite idea of the relative intensity of the light in both places. If, for instance, our first observation gives us the standard tint in six seconds, and a second observation in another room requires twelve minutes to give the tint, we know that the light there is 120 times weaker than at the window where we made the first observation. Hence it follows that if at the window one second is the correct exposure for a certain plate and lens aperture, we must give 120 seconds, or two minutes exposure, with a plate of the same rapidity and the same lens aperture, in the room where we made the second actinometer test. This shows the usefulness of the actinometer as a light measurer. If we make a tour of the rooms in the house between 11 A.M. and 1 P.M., when the light is fairly constant, the actinometer times given by the tests here and there with the actinometer, will give us a fairly correct idea of the relative exposures needed in each room.

**Exposure Meters.**

The calculation of exposures, however, depends not only on the intensity of the light, but also upon the character of the subject, the speed of the plate, and the lens aperture or stop used. Of these four essential factors the home-made actinometer gives us but one, so that its usefulness is very limited. What we need is a series of tables enabling us to apply the actinometer figures to the varying conditions of each exposure proposed. These calculations are part of all exposure meters or exposure tables : hence it is better to buy an exposure meter in the beginning, and save ourselves the worry of calculation and guesswork. For outdoor work I prefer Todd's *Tables* before any meter ; but for indoor work, Watkins' or Wynne's meters will be found more satisfactory. There is little choice between these two useful instruments, but I have mislaid my Watkins, so we will use the Wynne meter wherever needed in the preparation of these pages. Here I may say that, in using this meter in America, the American plates listed in Wynne's table should be taken as one speed number higher than that given them by Wynne.

**The Use of Exposure Meters.**

Let us take a Wynne meter, and make a few tests about the house in order to get a good grasp of this important detail of illumination and exposure. It is a November day, at noon. The sun is high and the sky is filled with white clouds. We propose to use a rapid plate, about speed F90 on Wynne's list. Exposing the meter to diffused light *outdoors*, we get the standard tint in 24 seconds. This is called the actinometer time. Placing the speed number of the plate (F90) against the figure 24 on the dial of the meter, we see at a glance that the exposure required is $\frac{3}{16}$ths second, with the lens at *f*/8. The exposure required with every other diaphragm is shown on the meter-dial at the same time. Going *indoors* we expose our meter in a well-lighted room, facing the windows, and get the tint in 8 minutes. The exposure indicated with *f*/8 is $\frac{1}{16}$th minute, say 4 seconds ; with *f*/16, 15 seconds ;

and with *f*/22, 30 seconds. In another room, less abundantly lighted, we get the standard tint in 27 minutes, indicating exposures of 2 and 4 minutes with stops *f*/22 and *f*/32 respectively. In an upper hallway the actinometer time is 64 minutes, necessitating an exposure of 7½ minutes with *f*/32, supposing the same brand of plates to be used throughout.

By this time the sun has come out and we return to the well-lighted parlor to see whether we dare attempt a group of two children. A light background and a white side reflector are arranged near a window to form a small studio. The group will be two feet from the window, and lighted by the midday sun filtered direct through a white muslin blind. The plate is an extremely rapid brand, listed by Wynne at F90, and taken as F111. Exposed in the shadow of the group the meter gives us the tint in six minutes. This indicates an exposure of 2 seconds for a normal subject with the lens at *f*/8. We remember the rule to multiply normal exposure by 1½ for portraits indoors, and give 4 seconds as a full exposure. Without sunlight, and with the blind lowered from the top, the actinometer time is 8 minutes, and the exposure, with *f*/8, is six seconds. Substituting a subject in dark dress, and a medium background, the actinometer time is sixteen minutes, and the exposure must be nine or ten seconds. Or it is night, and we want to photograph the table set for a small supper party before the guests arrive. We desire only the table and its arrangement; all else may be hidden in shadow. It is lighted by a four-jet chandelier, and on the table is a befrilled lamp with a pink shade. We expose the meter, facing the light source, in the shadow of the rose-bowl near the centre of the table. Using the lighter of the two tints on the meter-dial, the actinometer time is one hour and, taking the speed of our nonhalation plate as F45 when used with this lighter tint, we give an exposure of 16 minutes with *f*/22. Had we used a "backed" orthochromatic plate, an exposure of 12 or 15 minutes would have been ample. The quality of the illumination is an important factor here. With ordinary gaslight isochromatic plates will shorten the exposure. With incandescent gaslight, and either plain or orthochromatic plates, the exposure will be shorter than required by ordinary yellow gaslight.

Let us now see what the meter will tell us about the falling away of the illumination in a room as we work at various distances from the window. At four feet distant, we get the standard tint in 3 minutes (meter facing the light of the undraped window); at 8 feet distant in 12 minutes; and at 12 feet distant in 20 minutes. In the middle of the room the actinometer time is 15 minutes; this with *f*/22 indicates an exposure of one minute, with a plate marked F90 on Wynne's list. But we want to get all the detail under a certain black oak table. Placing the meter in the deepest shadow where we want detail, we get the tint in 24 minutes, so that our exposure must be 3 minutes with *f*/22 (normal exposure multiplied by 2), and we must control the contrasts in the negative by development or reduction with ammonium persulphate.

In this way we may gain a practical knowledge of the problem of exposure indoors without waste of plates or material, and when we come to photographing interiors will be able to handle them more intelligently than was possible without this knowledge.

**Photographing Interiors.**

Apart from the details of illumination and exposure, the chief things to be considered in photographing home interiors are the lens, plate, height of camera and point of view, and the general arrangement of the room. As the making of a series of interiors will give us much profitable information applicable to all indoor work, we will deal with this branch of at-home work first. If we are reasonably successful, our negatives will afford material for desirable souvenirs for distant friends, and in any event, we will learn many things well worth knowing.

**Camera.**

The amateur is generally obliged to make the best he can of the apparatus he has, so that little needs to be said about choice of apparatus and the like. Where choice is possible, however, a square-bellows field camera is preferable to a hand camera. A level or plumb indicator is indispensable if we want to make sure of vertical lines in dark interiors, where the ground glass image is almost invisible. The rising and falling front, now part of almost all folding cameras, will be found useful to increase or cut off foreground or ceiling as may be desirable. Sometimes, in using extreme wide-angle lenses for small interiors, a camera with a base board folding down at the front, or with a device for bringing the camera body forward on its bed, is necessary to prevent the front of the base-board intruding upon the field of the lens. If we use a tapering or conical bellows, care must be taken to secure the first few folds well forward by fastening them to the front-board, so that they may not obstruct the image on its way to the ground glass or plate.

**Lenses.**

The lens is an important item in interior work, because on the relation of its focal length to the base measurement of the plate used depends the amount of view included in the negative. This is known as the angle of view, and may be determined by dividing the base measurement of the plate by the equivalent focus of the lens.* If we use a lens whose focal length is greater than the base line of the plate, as a 7-inch lens on a 4 × 5 plate, the angle of view will be narrow, not more than 40°. This practically means that we cannot include in our view more than one side or a corner of the room. A lens of 5 inch focal length, used on a 4 × 5 plate, will include an angle of view of 53°. The same lens, used on a 6½ × 8½ inch plate, and stopped down considerably, would include everything within an angle of 80°. Whether the negative would be well defined or equally lighted at the corners and centre of the plate is another story. With a lens of 3½ inch focus, used on a 4 × 5 plate, we can include everything within an angle of over 70°. Hand camera lenses for 4 × 5 plates generally have a focal length of 6¼ inches, which includes a medium angle of view for average work indoors and out. For interiors of small rooms, or wherever the space is confined, a special wide-angle lens is indicated, such as Gray's *Extreme Angle Periscope*, which gives an angle of over 100° on the plate for which it is listed. The anastigmats of Goerz, *Series IV.*, *f*/11; Zeiss, *Series V*, *f*/18; and Collinear, *Series III.*, *f*/7.7, all giving a full angle, largest aperture, of 90°, offer evident advantages in definition and illumination for this class of work. The Ross *Wide Angle Symmetrical* and the Morrison *Wide Angle* are old favorites of mine and will be found altogether satisfactory for general purposes.

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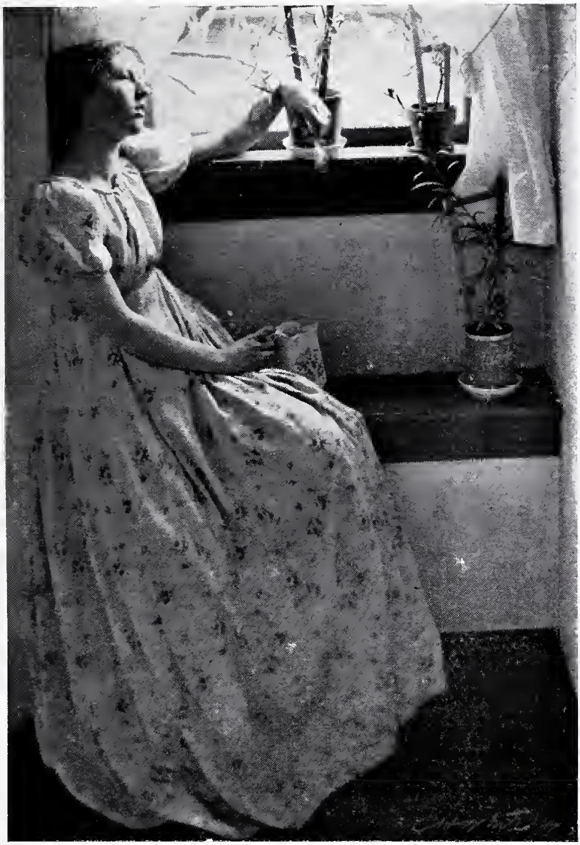
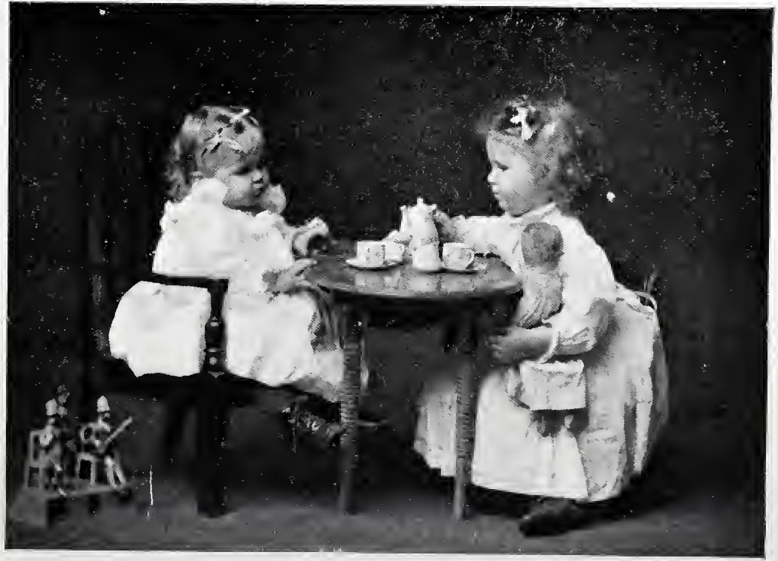
* See pages 23, 24, The Photo-Miniature: No. 1, *Modern Lenses.*



By Clarence H. White



AFTERNOON TEA
H. H. Pierce

**Plates and Halation.** As far as plates are concerned, we can use any plate we may have at hand, but certain plates are more suitable than others. Among the difficulties encountered in indoor photography that known as halation is perhaps one of the most troublesome, and it may be largely obviated by our choice of the plate or film used in making the negative. So much has been written about halation that I propose to touch upon it very briefly here. As every amateur knows, when we photograph against the light, as in an interior view where we are obliged to face the camera to a window, the intense light spreads beyond its proper boundaries, and a hazy blur or halo surrounds objects in close proximity to the light. This blur, known as halation, is seen around the window-frame, draperies, and encircling whatever is near the window and between the camera and the light. It is caused by the spreading of light in all directions among the particles of the sensitive film of our plate, and aggravated by the light being again thrown back into the film by reflection from the glass support, after it has once passed through the film and reached the plate. Of course, wherever there has been light action, there will be reduction on development, and the practical result is the light blur referred to above. The defect can be overcome, almost completely; first, by coating or "backing" the glass side of the plate with an easily removable non-actinic composition which effectually prevents the reflection of the light after it has completed its work in the film; second, the use of "non-halation" plates which are specially coated first with a "slow" and then again with a "fast" emulsion, so that the exposure is completed before the light reaches the glass support; and third, by the use of films instead of plates, especially roll films which have a strip of black paper behind them, by which the principal cause of halation is removed. The introduction of Kodak spools for 2 or 6 film exposures brings the use of films for at-home work before the amateur in a practical and economical way, obviating, as they do, the necessity of making twelve exposures before development.

**Backing Plates.** To "back" an ordinary or orthochromatic plate is easier than to describe how it is done. A dozen or two should be "backed" at one time and put away (after the "backing" is thoroughly dry) until required for use. Here is the method generally advised. First we need a composition that is effective, which will not injure the plateholders, and which may be easily removed during or before the development of the plate. Among commercial preparations Newcomb's *Nonhalation Comp* is efficient and convenient in use. Or we may employ a home-made mixture as follows: thoroughly mix, caramel, 1 ounce; strong solution of gum arabic, 1 ounce; burnt sienna, 2 ounces; and alcohol, 2 ounces. See that the mixture is free from grit or lumps, and bottle in a wide-mouthed bottle. To "back" the plates quickly and without messy handling, procure a piece of stout board three inches larger each way than the plates to be "backed." At the centre of the board glue a piece of canton flannel or velvet of the same size as the plate. Now cut a piece of cardboard the same size as this wooden base, choosing card of the average thickness of a plate, and hinge it to the baseboard so that it will fold over it. At the centre of this card cut out a rectangular space exactly the same size as the plate. When it is folded over the baseboard this open space will be exactly over the velvet square. The plate to be coated or "backed" is placed, face down, upon the velvet, and fits it closely in this square recess. The backing may now be applied with a small sponge or wad of cotton. See that it is evenly covered, then lift the cardboard and remove the plate, handling it by its edges. Store in a rack and dry in a room free from dust. Of course this "backing" and drying must be done in a room where no white light can reach the plates. The "backing" device may be used repeatedly, the velvet and cardboard being renewed when needed. Where plates may be bought ready backed for use, we may dispense with this trouble.

**Choice of View.**

The point of view from which the negative is made, the height of the camera, and the general arrangement of the room also need attention. If a characteristic picture of the room can be had without including windows in the view, this should be chosen. Sometimes an open door revealing another room will help the general effect in an interior; or we may be able to work from this adjoining room to better advantage. Doors, out of the field of view, opening into other rooms well lighted, should be opened during an exposure where a little extra illumination may thus be secured for the interior with which we are engaged. Where only a part of a room can be included in the view care must be taken to see that no prominent piece of furniture is cut in half by the edge of the plate so as to appear inadequately supported. We must avoid placing large or dark pieces of furniture too near the camera, and as far as possible dark objects should be placed so as to be well lighted, light objects being placed in the darkest spaces. In small views the appearance of an ordinary room is generally that it is overcrowded with furniture. Superfluous pieces may, therefore, be removed with advantage, as an amount of space will make the apartment look more roomy. No stiff or formal arrangement of an interior should be attempted ; let us have the room as it is in every-day life. But a little observation before exposure will often reveal possible improvements. Some sign of life or occupancy is desirable ; a piece of music at the open piano, a violin with its bow, or a guitar laid carelessly in a not too prominent place, or, in a bedroom, a pair of my lady's slippers will give the effect desired.

The height of the camera should not be overlooked. If it is placed too high the lines of the floor will convey the impression of a slope. In a room of ordinary size the lens should not be more than forty inches from the floor.

**Illumination.**

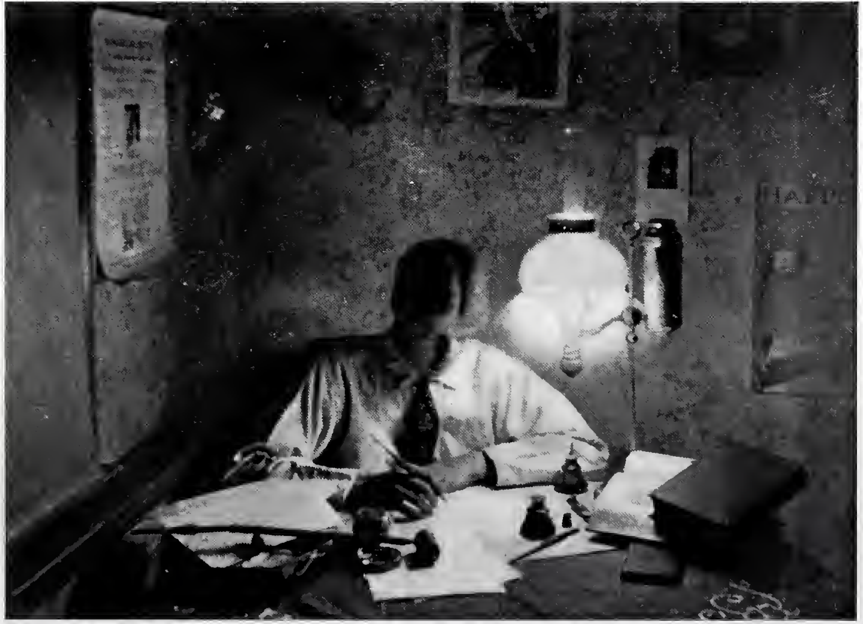
The inequality of illumination which is inevitable in home interiors may be largely overcome by care in the arrangement of the room, or by choosing such a time of day or year as gives a favorable lighting. Broad sunlight is rarely advantageous, as giving too forcible contrasts. Sometimes the quiet light of early morning will give the best results. Where there is an abundance of light the window or windows not included in the view may be covered with white sheeting and the light diffused in this way. The broad light upon the floor may be softened by drawing the blinds down from the top. Where we have to deal with strong lighting much may be done by screening the windows during part of the exposure, and giving a brief exposure with the windows in their normal condition toward the end of the total exposure.

When it is desired to include a figure in an interior view, we must use a lens which will permit of a short exposure without sacrificing definition, such as an anastigmat working at *f*/ 7.7, or even faster, and the figure must be placed so as to receive abundant lighting from the window.

The prevalent color of a room's furnishings also has considerable to do with the question of exposure. Where we have to deal with dark or red or yellow draperies, floor covering, or furniture, the exposure must be lengthened accordingly. A test will tell us more about this than much writing, and where color is concerned, the use of well-backed orthochromatic plates is indicated.

**Gaslight Interiors.** We can now take up the question of interior work at night or by artificial light. Is it possible to do anything in this line by gaslight or electric light? Yes, it is possible, but we must be resourceful and patient, and we will need an anastigmat or other quick-working lens if life subjects are to be attempted. For plain interiors any lens will give very pleasing results if properly handled. I have before me as I write an excellent portrait of a child asleep in her crib. It was made by the light of a single gas-jet enclosed in a ground-glass globe, and fixed about 4 feet above and at one side of the crib. The light was not included in the picture. The exposure on a rapid plate was two minutes with a *Goerz* lens at *f*/ 7.7. The negative is thin, but full of detail. I have another 4 × 5 photograph of a room almost sixteen feet square, lighted by three gas-jets and a lamp or two disposed behind a screen or in a chair to illuminate the darkest spaces. The exposure was 38 minutes with a Ross *W. A. Symmetrical* working at *f*/16. The shadows are somewhat abrupt, and there is a little halation around the gaslight globes. A nonhalation plate was used, and the halation and harsh lights considerably modified by careful development and the use of ammonium persulphate as a reducer after development and fixing. Another print shows a portrait of a lady reading by a lamp at the table. The face is in shadow and the pose was arranged to give ease and abundant support to the figure. There is evidence of movement in the figure, and the illumination is emphatically local; but by judicious printing a very pleasing picture was secured. The exposure was twelve minutes with a *Goerz* lens working at *f*/11, and a backed orthochromatic plate. These instances show what may be done. In attempting work by gaslight the greatest difficulty lies in the abruptness

By H. H. Pierce



BURNING THE MIDNIGHT OIL
F. T. Aschman

and heaviness of the shadows, giving disagreeable contrasts. Skilful local lighting by lamps placed here and there, out of the range of the lens, and careful work after the negative has been developed "for all it is worth" will usually moderate these defects. A certain amount of halation is inevitable, but this may be helped in development, and afterwards by treatment with ammonium persulphate, and local reduction of the harsh lights by rubbing with a tuft of cotton charged with alcohol. The exposures required will range from half an hour to two hours, according to the amount and quality of the illumination available, and the character of the furnishings of the room. Where it is possible we must avoid including the lights in our view; this is easy when the room is lighted by side brackets, but difficult when we have to deal with the familiar chandelier hung from the ceiling.

**Development Note.**

The development of such negatives is an art in itself. It is not so much a matter of what developing agent to use, as our familiarity with its properties for giving all possible detail without fog. Rodinal, tolidol, eikonogen, and metol-hydroquinone are good, but pyro will give us all we need if we handle it aright. The others are easier for the amateur. Ammonium persulphate used as a reducer in this class of work is simply invaluable. Its peculiar advantage lies in the fact that it attacks the denser portions of negatives in preference to the finer details of the half tones and shadows. Knowing this we may slightly over-develop our negatives to get all the detail possible in the shadows and leave the lights for after reduction. Fifteen grains of ammonium persulphate to each ounce of water forms a convenient working solution. When sufficiently reduced in this, immerse the negative in a ten per cent. solution of sodium sulphite for a few minutes and then wash it well.

**Flashlight Interiors.**

Next in order comes interior work by flashlight. By those familiar with the use of flashlight, this form of illumination is preferred before daylight or gaslight as permitting complete control of the illumination of the room, and giving a softer and more diffused illumination. Interiors of small rooms, without life, such as are found in the average home, do not present much difficulty, provided always that we are familiar with the handling of the flashlight employed. The various forms of flashlight, and the apparatus provided for their safe and convenient use, are described on other pages. The reader is advised to read that section carefully before beginning his experiments. Here we will concern ourselves simply with the management of the light for the purpose under discussion.

If the room is small, such as an interior twelve by fifteen feet, a single flash from one point will be sufficient with a lens working at *f*/16 or a larger aperture. For larger rooms, or a room with unusually dark furnishings, two flashes may be necessary. In this case, when the room has been thoroughly cleared of the smoke of the first flash, a second flash should be given at a point about four feet away, and in line with the first flash. This will insure abundant and broader lighting. Care must be exercised that the flashes are not too far apart, or confused lighting and crossed shadows will result. We must also be careful that mirrors or picture glasses do not reflect the intense light of the flash. This may be determined by holding a lighted taper at the point where the flash will be made. If the reflection is seen (from the camera) in a mirror or picture glass, these should be tipped at such an angle that the light is no longer visible.

The best general effect is produced by flashing the light about two feet behind, and two or three feet at one side and slightly above the camera. In this way the shadows will be given an agreeable direction, and we will get desirable relief. The lighting may be accentuated by placing a fairly large sheet of white cardboard behind the flash point, and it is well to place a tray or receiver of some kind beneath to catch the odd sparks or burning particles which may fall to the floor after the flash. In choosing a point from which the flash is to be made, we must avoid proximity to lace curtains or similar inflammable fabrics. Focusing may be done with the usual illumination of the room, or by means of a candle held here and there if the image is not readily seen on the ground glass. The gas, or other illuminant ordinarily used, may be kept burning during all the operations, even during the exposure. When all is ready for the flash, the plate may be uncovered, and the lens or shutter opened; the few seconds intervening before the flash will not harm the plate, but, on the other hand, will assist the general illumination of the view. Immediately after the flash, however, the lens should be covered, and the plate-holder closed.

The light of a single flash being necessarily more or less local, and falling away in intensity very rapidly, a short focus lens (wide angle) will give definite advantage over one of longer focus.

The form of flashlight used must be left to personal choice. For the beginner, or for small rooms, Eastman's *Flash-sheets*, and *Bostwick's*, *Sun-Flash*, *Ideal*, *Real Rapid*, or Eastman's *Flash-Cartridges* will afford the simplest means of making interiors without the aid of special apparatus other than a reflector and a fire-shovel.

Pure magnesium also offers an excellent light for home-work where interiors without figures are wanted, and is less troublesome to handle than a mixture. It may be fired by means of a simple lamp such as the *Pine*, *Ray*, or *Hale*. Highest in efficiency come the *compound* powders, to be used carefully and with scrupulous attention to the makers' instructions. These mixed powders are necessarily explosive and should not be subjected to any friction, or used in a magazine, or any other form of lamp save one specially constructed for their use.

The amount of material required varies with the size of the room, the aperture of the lens, and the general character of the furnishings. Where these latter are dark in color the normal amount of flashlight powder must be increased fifty per cent. The instructions given with the various commercial powders will generally indicate their capacity, and what amounts to use under varying circumstances. As a general suggestion it may be said that, for a small room and with a lens working at *f*/16, a single flash-sheet, or one small cartridge, or twenty grains of magnesium, or forty grains of a compound powder (whichever we may use) will furnish us with sufficient illumination for the average interior.

**Interior and Exterior Combined.**

Where an interior has an attractive out-door aspect, as when a window overlooks a garden, a pleasing view showing the interior *and* the outdoor scene may be secured by combining daylight and flash-light exposures on the same plate. This may be done by making the flash-light exposure of the interior at night, and leaving the camera (lens covered and plate-holder closed) undisturbed until the following morning, when, from the same spot, and on the same plate, a very brief (second) exposure is given to secure the view seen from the window, which latter should be opened for the moment. It is obvious that, in attempting such a picture, the windows of the room should be opened after the flash-exposure to clear the room of smoke, and the room itself should be locked overnight to insure that the camera shall not be disturbed.

**Home Portraits by Daylight.**

The making of portraits at home, by daylight or flashlight, brings the amateur to the most interesting of photographic fields. It is a field as difficult as it is fascinating, which accounts, in part, for the heavy percentage of failures we see in amateur work of this class. If we will abandon, in the beginning, all desire or attempts to make portraits like those made in professional studios, we will find that very satisfactory results may be secured at home, even with a hand camera. The only real difficulties are the lighting of the subject and the exposure, and in these our previous indoor work will help us very much.

Let us take up daylight work first. We need a room with a window facing north, and having an open, unobstructed view, *i.e.*, not shaded by trees or nearby buildings. The higher the window the better. Sometimes a hall or other room which has a window placed high in the wall will be peculiarly advantageous. If we cannot have either of these, a window facing south, screened by a sheet of white muslin, will give us good results. As the light changes constantly from a south window the lighting here will, of course, be more difficult. Having chosen a suitable window we make two or three actinometer tests at three, five, and six feet from the light source, calculating for the use of the largest stop our lens will allow, to find the most suitable place for the subject. Where it is possible, about five feet from the window, and slightly behind it, should be chosen. This will give us a fairly soft, round lighting, with desirable shadows. If the light is poor we must work nearer to the window, but this will make it difficult to avoid harsh lighting. An experiment shows that the light is much too strong on the lower part of the figure. This is caused by the fact that our window is too low. We cannot increase its height, but we can cut away the light by blocking out half or one-third of the lower part of the window with a shawl or piece of dark drapery. The light should now fall upon the head and shoulders of the subject. If the shadow side of the face, regardless of the direction of the head, is too dark, a white sheet or other reflector brought to within three or four feet of the subject will throw a little light where needed. By careful manipulation of the reflector, we secure the desired illumination of the shadows, but if we overdo this, the result will be flatness. A little observation will tell us when the reflector may be dispensed with, when desirable, and how it should be placed. Roundness and modelling are the two points to be chiefly considered. When a willing model is at hand a few hours spent at odd times in the study of lighting the face and figure will be of great assistance.

**Lighting the Subject.**

It is important that the subject shall be lighted from one source only, so that if the room has two windows, one must be darkened. If the light given by a single window, necessitates too long an exposure, say more than twelve seconds, we must bring the subject as near to the light source as we can, and by the use of a fairly light background and side-screen, make a small studio around the window, so as to secure all possible illumination. This will generally be necessary when we attempt the portraiture of children indoors, or have to work with a hand camera lens whose largest stop is *f*/16 or *f*/20. With a rapid plate, and a lens working at *f*/8, we can afford to get farther away from the light source. With a north light, and a bright day, the exposure at noon will rarely exceed five or six seconds. When the subject is dressed in dark clothes, or the room has dark furnishings, of course, the exposure will have to be lengthened. The lighting and disposition of the figure in portraiture are subjects much too difficult to be referred to in a paragraph. If, in the first, we try to secure roundness and modelling, with a pleasing expression; and in the second, an easy, natural position, we will have made a good beginning. From this beginning, by constant observation of lighting and posing as seen in every-day life, and a knowledge of what we will find in *Artistic Lighting* by Inglis, and the second number of THE PHOTO-MINIATURE: *The Pose in Portraiture,* we will very quickly grasp the essentials of these two details of portrait work.

**Backgrounds.** As far as the background is concerned a curtain, rug, or screen will often prove altogether satisfactory, but for convenience in working a set of small backgrounds on a roller, which may be suspended on the wall in a moment, will be a profitable investment. Several makers, such as Seavey, Buchanan and others make a special line of backgrounds for amateur portraiture at home. A few yards of gray felt, sufficient to form a floor-cloth as well as a background will be found useful. This comes in six feet widths and may be had at the dry-goods stores. The "wide width" cloths used for blinds may also be mentioned as offering excellent material for backgrounds. Those without a "finished" or glazed surface should be chosen, and the shades of gray will be most useful for general purposes. The influence of the background upon the portrait is a detail which deserves careful study, the characteristics of the portrait being altogether different when light and dark grounds are used. For this reason, when we have only one background, it should be one graduated from light to dark, so that we can reverse it and soften or emphasize the general effect in the picture as may seem desirable. The smallness of the image within the picture space is a practical difficulty encountered in at-home portraiture with the hand camera. This can be overcome by the use of a supplementary lens, placed in front of the lens attached to the camera, by means of which a larger image is obtained. The *Ideal Portrait* lens and the *Beck Magnifiers* may be mentioned as desirable aids for this purpose.

**Home Portraiture by Flashlight.** In taking up flashlight portrait work at home, the first essential is to get acquainted with the various forms of flashlight material and the apparatus needed for its use. What we want is sufficient light to enable us to get a portrait or a small group at night in an ordinary room. Either powdered magnesium or a compound of magnesium with other chemicals will give us this light, and the apparatus for their use fairly puzzles one by its almost infinite variety. Magnesium is perfectly safe in its handling and combustion, but slow in combustion unless we use what is known as a "blow through " lamp, by which the metal is projected through a flame. It also has the disadvantage of giving a great amount of smoke and dust after exposure. For these reasons it is little employed for portraiture in the home, although still much used in commercial work. Perhaps the simplest lamp for the combustion of magnesium powder is *Hale's*, in which an even, solid flame of light is obtained. The *Lightning Storage Lamp*, the *Ray*, or the *Mize* are also good lamps of this class.

*Compound* flashlight powders are obtainable in the form of *flash-sheets*, *cartridges*, and the powder in bulk, usually packed in bottles. These are usually composed of powdered magnesium or aluminum with chlorate of potash or other chemicals which supply oxygen and therefore give a "quicker" and more intense light. This shortens the exposure, and *compound* powders also yield less smoke and dust than magnesium alone. In handling or using *compound* powders two things should always be remembered: *First*, that they are explosive, and therefore must not be submitted to friction of any kind, and *second*, that they should never be used in a magazine or storage lamp, or in any lamp except one constructed for compound powder. The instructions and warnings sent out with the variety of powder used should also be carefully read and followed. With these precautions any make of flash powder may be used with safety and confidence.

**Materials and Apparatus.** For single portraits in a room with light furnishings Eastman's *Flash-sheets* are at once simple and efficient. Two or three small sheets, pinned together on a piece of white cardboard, so that the corners slightly overlap, will be found sufficient if properly placed. When ready, open the lens, and touch a match to the sheets.

The *Cartridge Flashlight* is also a very convenient form to use. This consists of a round or square or oblong box, filled with compound powder, and with a fuse attached. Bostwick's *Perfect Flash Cartridge* may be taken as typical of its class. To use it, this is taken from its metal packing-box, untwisted carefully, and placed on a fire-shovel or a tin box-lid of sufficient size. The wrapper is ignited, the lens uncapped or the shutter opened, and the flash takes place. The *Sunflash*, *Sunlight*, *Eastman*, *Ideal*, *Scovill*, *Real Rapid*, and *Luxo* cartridges are manipulated much in the same way. There is little choice among them, experience showing that they are all efficient for their purpose. They may be had in various sizes; but for home use the smaller sizes will be ample for all needs.

Among *Compound* flash powders in bulk I have used *Luxo* with complete satisfaction, but almost every other powder tried has more than met all my requirements. The new *Pfabe* powder is an excellent mixture, as are *Sunflash*, *Blitz Pulver*, and the Eastman flash powder. It is a good plan to choose one and use it only, until its qualities and shortcomings are known, by which time we will be in a better position to appreciate others. What we need is a powder which will ignite easily and quickly, rapid in combustion and giving a powerful volume of light with as little smoke as possible afterward.

For the combustion of compound powders a lamp is not necessary, although preferable, as offering greater efficiency and economy in the use of material. When used without a lamp the powder should be spread out in a train on a sheet of tin or other metal tray. At one end of the train insert a piece of loose, fluffy cotton batting about the length and thickness of a finger, and sprinkle a few grains of the powder at the end of the cotton where it enters the train. Let the other end of the cotton project an inch or so beyond the metal tray. When all is ready for the exposure, the tray being placed at the right point, light the end of the cotton with a taper, the lens having been opened previously. The cotton will burn at the rate of about an inch per second, so that there will be ample time to withdraw the hand. Among the lamps available for use with *Compound* powders the *Luxo*, *Eastman*, *Ideal*, *Dewey*, *Sunflash*, and *Ætna* lamps offer abundant room for choice, both as to quality and price.

**Warnings.** A few hints from experience in the handling of *compound* powders *and* lamps may possibly save some reader from accident, hence I make room for the following notes: The conditions under which a compound flash powder will explode are not known. Generally speaking, ordinary care is sufficient, but beware of friction. In opening bottles or boxes of powder, cut the paper binding carefully, then, holding the bottle at arm's length, gently ease the lid off with a knife or envelope opener. Before replacing the lid or closing the bottle, blow off or remove any particles of powder which may have adhered to the bottle. When filling the lamp employed never pour the powder into the pan direct from the bottle. Use a small measure, cup, or spoon, holding only the proper charge. Never fill the pan or powder-receiver while the burner, taper, or wick is lighted; always turn the latter away, or remove from the lamp when the pan is being filled. Never light the burner, taper, or igniting torch while it is over the powder. Never hold the exposure bulb in the hand when fixing the burner or taper over the powder. Always make sure that there are no curtains or other combustible materials near the point from which the flash is made. Always see that the lamp is securely placed when it is not held in the hand, lest the pressure of the bulb or a sudden jerk upset it at the moment of flashing. Always turn the subject's head away from the flash, and do not look at the light yourself at the time of the flash. Open the windows at top and bottom, and close the lens and plate-holder, as quickly as is possible after the flash has taken place. Beware of attempting flashlight portraits of people subject to hysterical fits or epilepsy. Keep the usual lights burning during the flash exposure.

**The Lighting.** Before attempting actual work with the flash, however, it will be needful to have a clear idea of the character of the lighting, in order to know where to place the lamp, and at what angle the light will fall. This may be gained by preliminary practice with gas or lamplight. As far as possible, the light should be above the level of the subject's head, and to one side, so as to fall upon the face at an angle of 45 degrees. If we place our model about six feet away from the source of light, where we ourselves stand, and study the changes in lighting as the model turns this way or that, the best lighting will be observed and may be noted for future use. By placing the camera where we stood during our observations, and making the flash from the same point as the source of light used in our experiments, the desired lighting will be easily secured. With the subject six feet distant from the flash, and a lens working at *f*/16, about 45 grains of powder will be necessary for a single flash. If we use a screen between the flash and subject to diffuse the lighting, the charge should not be less than 60 or 70 grains. Children require less powder than adults.

**Flashlight Silhouettes.** Before leaving the subject of negative making by flashlight, the use of the light in the production of Christmas or other cards may be mentioned. Flashlight silhouettes come under this heading and are made as follows: Across an open doorway, or at the opening between two connecting rooms, stretch a white sheet without creases or folds. In one room (behind the sheet, and at a distance of six or eight feet from it) arrange everything for a flash exposure. A single flash-sheet, or small cartridge, or ten grains of powder will suffice. In the other room pose the subject or subjects as near to the sheet as possible, and give them occupation. Thus two ladies may be sitting, busied with their embroidery, or a girl may be posed, standing, with her violin in characteristic attitude, or a baby may be seated at table in a high chair. In this same room focus the camera on the subject, lower the gas a little, uncover the lens and plate, and quickly go into the other room (behind the sheet) and make the flash. The result, on development, will be an attractive silhouette which, printed on *Velox* or any other paper, will form a very desirable greeting card for a friend of the subject. The theme of the silhouette picture may be varied infinitely according to personal taste. Two men playing chess, a child with toys, or a woman trimming a hat are subjects which suggest themselves. In a similar way silhouettes may be made of the Christmas-tree, or of decorative forms made by arranging branches, twigs, or flower-sprays upon the screen formed by the sheet.

**Photographing Flowers.** The photographing of flowers, fruit, and still-life subjects forms a delightful photographic hobby peculiarly adapted for pursuit at home. Properly handled, such subjects tell most interesting stories. The work involved is a pleasant occupation for the leisure hours, and brings us face to face with absorbing problems. The negatives used may be utilized in a variety of ways to give pleasure to others as well as ourselves, or for the decoration of the home after an attractive fashion. Early in the new year it is proposed to devote a whole number of THE PHOTO-MINIATURE to this special hobby, but a few hints given here may be profitable and sufficient to set the reader thinking over the possibilities of the field. We need for the work only the apparatus included in the ordinary amateur equipment, a single or long focus lens, orthochromatic plates and a color screen. If we have already mastered the meaning of orthochromatic photography, as explained in number six of THE PHOTO-MINIATURE, the usefulness of color sensitive plates and color screens will be fully appreciated.

**Illumination.** Flower photography, like portraiture, needs a quiet, diffused light. The best time for the work, therefore, is in the early morning or late afternoon, and the best place, a window facing north with the unobstructed light of the sky. When we work at a window lighted by the sun, the window should be screened with translucent paper or tracing cloth, so that the light is diffused and softened. Softness of illumination, delicacy of modelling combined with the natural vigor of the subject under treatment, and the appearance of life, are the three points to be aimed for, and they depend upon the lighting and arrangement of the subject. Values of tone and texture are also important ; stiffness or formality are things to be carefully avoided. Generally speaking a side or three-quarter lighting will give us the most favorable angle of illumination for most subjects. Sometimes, however, a top light alone, or a method of lighting in which the light is thrown upward with a mirror, will be advantageous. In most cases a white reflector to throw illumination into the shadows will be useful, but this must be carefully handled. A few experiments will tell us the value of these devices. Almost invariably, the light should come from one source only, but auxiliary illumination will, at times, be found very helpful to reveal the peculiar translucency of some flowers. To keep the flowers from drooping the stems may be kept packed with very wet moss, or we can seal the cut ends of the stems with wax, which will preserve them fresh for a long time.

**Arrangement.** The arrangement of flowers, singly or in groups, or sprays, or single branches, is an art difficult to teach in a few words. A touch here and there will often disturb or improve in an incomprehensible way. Simplicity, and an endeavor to reproduce the natural characteristics of the subject, are the keynotes to successful arrangement. Where several blooms of one flower are photographed in extended formation, to form a panel or frieze, care must be taken to secure variety, and avoid monotony of design. Writing of this an experienced worker says: "Form and texture of flowers demand special attention, as a variety of blossoms crowded into one photograph destroy the effect of graceful tendrils and natural beauty, and present to the eye a blurred and meaningless mass. Quantity is not needed to make a picture, and upon no account have a mixture of garden and wild flowers. A plentiful array of foliage is an improvement in a floral study, and a few buds break the rigidity of the whole and display the beauty of the full-blown flower more prominently. A defaced or worm-eaten leaf mars the otherwise perfect plant, but that can be manœuvred by replacing it with a faultless one with the assistance of a touch of gum. Wild flowers, so delicate in texture and modelling, must be carefully dealt with, especially their foliage, as it is too often sparse and puny looking, demanding a sprinkling of wayside grasses to give variety to the fragile forms. The loveliest forms should be selected for photography, and single plants, growing in moist soil and partly sheltered from the burning heat of the sun, lend themselves splendidly to graceful effects. The first arrangement of a floral study will probably not be very encouraging, but it is principally from failures we learn. Practice makes perfection, and the gradual ascent is smoothed to the painstaking student. Flowers are generally troublesome to photograph growing—their homes are ofttimes unevenly lit and the background unsuitable; still, a natural representation of them can be secured, although they be cut blooms, by examining their haunts and carrying out the idea impressed on our minds on reaching home. Overcoming the initiative stages, other schemes of arrangement will readily present themselves to the true lover of the beautiful. A simple and easy plan to display flowers naturally is to fill a long narrow box with damp sand, and, using that for a support, arrange them according to the uniformity of the foliage and flowers. It would hardly be possible to steady the stems of the flowers out-of-doors unless they were propped up, thus damp soil is essential. A more realistic picture could be obtained if the front and sides of the box were covered with moss, to allow gradation in height for the numerous stems, instead of cutting them across in a line with the receptacle. View the design from various directions, and, if it pleases, place it about three feet from the background, thus getting rid of reflections."

**Accessory: Background.**

The introduction of a glass bowl or vase will sometimes lend desirable support, in fact and tone, to a fragile subject, but natural forms are often most attractive of themselves without the addition of anything else. What, for instance, could be more desirable to the eye than a single sprig of mistletoe against a panel of grained oak, or a trail of ivy leaves decoratively disposed over a delicately tinted card! Similarly a spray of holly with berries, the long, graceful lines of golden rod, or a few Bermuda lily blooms, offer excellent material for the decoration of a panel or dado.

After lighting and arrangement, the background is a detail of much importance. Plain tinted grounds are to be preferred, and the cartridge papers used for wall hangings, or some of the more delicate of cloths used for book-covers offer abundant choice. A large picture or canvas stretcher, on which coarse linen has been stretched, will serve as an admirable base for many different grounds. For light flowers a medium tone or dark ground is generally desirable, and for dark flowers a lighter ground. Extremes are to be avoided.

**Decorative Natural Forms.**

A very simple method of making photographic reproductions of decorative natural forms—such as details of flowers, ferns, small plants, leaves, seaweeds and grasses—is that described by M. Jules Carteron a few years ago. In this method no camera is necessary, a printing-frame and supply of sensitive paper being all that we require. A fairly large printing-frame is desirable as permitting of the arrangement of the subject: for printing papers we may choose from the familiar "blue print" paper, Eastman's new *Sepia* paper, or *Autotone Matt*, or any variety of print-out silver paper. The printing-frame should be fitted with a piece of clear plate-glass, and should be of the box pattern, so that we may use a certain amount of padding (soft blotting-paper) to secure perfect contact everywhere between the subject and the sensitive paper. To make the print, the plants, or leaves or grasses, as the case may be, are carefully spread out upon the glass with such arrangement as is possible or desirable. Next place upon the plant a sheet of "blue-print" paper of suitable size, allowing the paper to come into close contact with every part of the original. Over this place several sheets of blotting-paper, so as to form a cushion; then close the frame by means of the usual springs. Expose for about fifteen minutes in sunlight, and develop with water, which will yield an image of a pale blue color upon a background of a darker shade. Such a print as this serves well for an herbarium of pictures, the dentition of the leaves being finely marked, and the shades of coloring very apparent. Of course the record so obtained is a negative record. What shows clear on the print is opaque in the plant, and *vice versa*. The silhouette detail of the plant is traced upon the paper by the solar rays in the same way as the silhouette of an object is traced by the X-rays upon a sensitive plate. Besides this, it would be difficult to make many prints exactly alike from the same original, for it is hardly possible to open the back of the frame without displacing the plant, or modifying the position of the leaves; for these reasons a second method is desirable. We therefore make a negative of the plant as before, only the material used for this negative should be *autotone*, or *sepia*, paper, as being thinner, more transparent, and consequently more sensitive than "blue print" paper. This paper negative we need simply fix in hypo and wash if an *autotone* print, or merely wash in water if on *sepia* paper, and then dry. In order to render the part printed more transparent, and also to show more detail in the positive, place the paper against the glass of a window (the sensitive side against the pane), then with a fine brush charged with oil follow carefully the lines representing the plant on the back of the print, keeping rather within the outline, as oil always spreads. Use blotting-paper to remove all superfluous moisture. With this as a negative, very many clean and well-defined positives can be obtained. On these two papers the image stands out in a kind of tobacco color upon a very slightly toned ground. This tobacco color is very favorable in representing many plants, and prints thus produced present the appearance of a dried plant mounted on a paper support.

The method is one which lends itself peculiarly to gum-bichromate printing, in which we may control the color of the print. By rendering the negative transparent it is possible to bring out the minutest details of the subject. Its possibilities for the decoration of *menu* and other cards, for suggestions helpful in design and similar purposes will be evident.

The oil used may be olive oil, but from experience the better kind to use is benzine mixed with a small quantity of glycerine.

Photographs of fruit, as a rule, are improved by the introduction of an accessory. Thus a fruit-bowl of oriental design, or a basket carelessly placed, or a little rough foliage will often help in the composition of the picture. Beware of any formal arrangement, and illuminate the group so that the natural forms are kept with only a touch of light here and there. The cast shadows are important and should be given careful attention in lighting. With most fruits a color-screen will be desirable, enabling us to retain the different tone values of the colors.

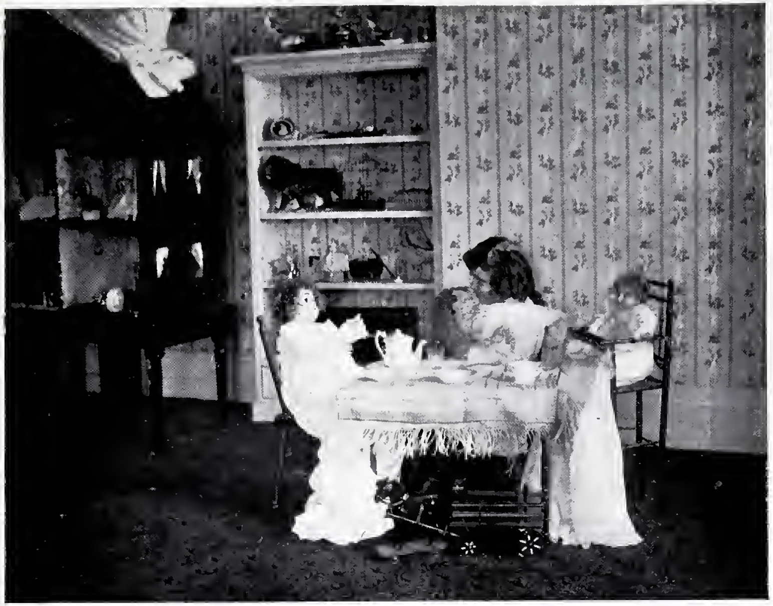
Still-life picture-making offers a wide range for the individual fancy. Groups of game; arrangements of oriental fans, draperies and feathers; a shield, with a bit of old armor and a gauntlet; a lamp, with an open book and spectacles; a few toys and a pair of baby shoes and a corner of the nursery; or a favorite window-nook with my lady's desk; these suggest themselves as likely subjects which, treated pictorially, are well worth a plate.

In dealing with such subjects a full exposure is always desirable, and the development should be directed toward the securing of a rather thin, detailful negative which will yield the different values and textures of the subjects as the eye perceived them in the originals. In the making of prints the carbon process seems especially desirable, as giving no color, which oftentimes will add interest to the picture.

**Enlargements by Daylight.**

For many pictorial and decorative purposes the amateur will experience the need of a simple method of producing large pictures from his small negatives. This brings us to enlarging on bromide paper as among the things which may be easily and profitably done at home by daylight or artificial light. For daylight enlarging no special apparatus is needed, beyond the camera and lens used to make the original negative, and a couple of large trays for the development and fixing of the enlargement. Presuming that we do not intend an enlargement larger than 10 x 12 inches, these latter may be of vulcanite or japanned tin, and inexpensive.

**Apparatus.** To begin, we require a small room to ourselves, with a window facing north, and giving us an unobstructed view of the sky. This window we make absolutely dark by fitting to it a light wooden framework covered with black cloth, or two thicknesses of brown paper. The room is now quite dark, and we must work by gaslight until we are ready to enlarge. In the window shutter, at a convenient height, we cut an opening exactly the size of the negative to be enlarged. At the two sides and bottom of this opening we glue three wooden laths, and fasten a drawing pin in each, so that we can slide our negative in, upside down, and it will be held close to the opening. The film side of the negative must always face the back of the lens. Outside the window we place a sheet of white cardboard, or a mirror, at an angle of 45°, so that it will help us to throw as much light as possible through the negative at the opening in the shutter. Returning indoors, we place a long table with one end close up to the window, and on it place a box of such a size that, when we place our camera on the box with the lens pointing into the room, the back of the camera (ground-glass removed) exactly covers the frame enclosing our negative. The light reflected by the cardboard outside now streams into the room, passing through the negative, camera, and lens. At the other end of the table we place a box on its end, and take care that it shall be perfectly upright. To the front of this box, facing the lens, we pin a sheet of white paper measuring about 11 x 14 inches. The image of the negative in the window appears (upright) upon this white screen. By moving the box nearer to or farther away from the lens we get the enlarged image of the desired size, 10 x 12 inches, but it is not sharp, *i.e.*, its details are not clearly and distinctly defined. By means of the focusing front of the camera, or by moving the box a little back or forward, we gradually get the enlarged picture of the right size and perfectly sharp ; in other words we focus it correctly. The brightness or illumination of the image depends upon the intensity of the light outdoors, and the diaphragm used in the lens. We must use as large a diaphragm as we dare, consistent with the desired de-



A FAMILY GATHERING
Mrs. C. W. B. Ward

By R. H. Furman

gree of sharpness in the picture. If the image is not equally sharp all over, we must see whether the front of the box carrying the sheet of paper is perfectly parallel with the negative. This is essential. Another detail to be looked after is to make sure that no light enters the room save through the camera and lens. When we have got all these preliminaries arranged to our satisfaction we are ready for the actual work of enlarging on bromide paper, and from now on must work by the light of our dark-room lamp.

**Manipulation.** What is bromide paper? It is simply paper coated with a sensitive emulsion, exactly like that which, coated on glass, forms the sensitive dry plate used in making negatives. The emulsion on bromide paper, however, is much less rapid than that used in making plates. Thus we must handle bromide paper with all the care used in handling sensitive plates before exposure, and scrupulously keep it from white light until it has been exposed, developed, and fixed. Its manipulation is precisely similar to that employed in making negatives, but the character of the support (white paper) indicates that we must be more careful in the matter of cleanliness in our manipulation of paper than with plates.

Covering the lens, and working by the dim red light of the dark-room lamp, we open the package of bromide paper and take out a single sheet, which we cut into strips one and a half inches in width and the full length of the sheet. These we will use in making test exposures to ascertain the correct exposure for our enlargement from the negative in hand. To make a test, pin one of the strips to the cardboard or sheet of paper on which the image was focused, in such a direction that it includes part of the shadows in the picture. Now cover three quarters of the strip with a piece of brown or black paper and (supposing that we have bright light outdoors, a negative of medium density, and stop *f*/16 in the lens) give the quarter of the test strip an exposure of one-half minute. Cap the lens, uncover another quarter of the strip, and give it an exposure of another half minute. Repeat this operation with the remaining two quarters of the test strip, and replace the cap on the lens. We now have a strip which has received four different exposures. The first quarter of the strip has had two minutes exposure; the second quarter, one and a half minutes; the third, one minute; and the fourth quarter, one-half minute. Upon developing this test strip in the developer yet to be given, we will be able to judge as to the correct exposure required, to get a good enlargement. Very thin negatives will sometimes require only ten to thirty seconds; negatives of medium density from one-half to one and a half minutes; very dense negatives from one and a half to several minutes; after a little experience we will find ourselves able to judge the exposure required by the appearance of the negative on the screen. When once we have determined the correct exposure for an enlargement from any particular negative, and have *also* taken the *actinometer time* of the light by exposing our Wynne meter at the opening in the window through which the light enters, we can obviate any difficulty in making other daylight enlargements from this negative by marking on the edge of the negative the exposure time and the actinometer time. Thus suppose the time of correct exposure was fifteen seconds, and the actinometer time was only six seconds, we mark the negative 15 *Ex*/6 Act. If we divide the correct exposure time by the actinometer time we get two and one-half as the result. Then we know that, for all after enlargements of the same size from that negative, on the same brand of bromide paper, the exposure should be two and one-half times the actinometer time. After a few negatives have been tested and noted in this way we will be able to intelligently compare other negatives with these tested ones and judge, approximately, of the exposure they will require without the necessity for a special test with each and every negative.

Having determined the correct exposure required by the negative in hand, we return to the darkened room and pin upon the white card opposite the lens a full sheet of bromide paper, uncover the lens, and make the exposure. The lens is then covered, and the exposed print is removed from its support, enclosed in a light-tight envelope or tube, and taken into the dark room for development.

**Development.** It is agreed that next to ferrous oxalate (which we will not trouble with) a combination of metol and hydroquinone gives the best developer for bromide paper. An excellent formula, originated by Yellott, is as follows: Dissolve 55 grains of metol and 55 grains of hydroquinone in 40 ounces of water; add sodium sulphite, 2 ounces, and sodium carbonate, 2 ounces. This forms a one-solution developer which may be prepared some time before it is needed, and stored in 2-ounce bottles carefully corked. Two ounces of this solution gives us a sufficient quantity of developer for an enlargement not larger than 11 × 14 inches. Just before use the contents of one bottle should be diluted by adding from two to four ounces of water, and three or four drops of a ten per cent. solution of potassium bromide. This developer can be used repeatedly, but if it is used too often will give greenish-black tones. Care must be used not to add too much potassium bromide; too little will result in degraded whites, and the print will acquire a foggy appearance; too much will give unsatisfactory tones. What we must seek to obtain is a rich black tone, like that of a good platinotype print.

To develop the enlargement, lay the print, face up, in an 11 × 14 tray and flood it with water for a few moments to prevent it curling; pour off the water and, with a steady, even motion, flow the diluted developing solution over the whole of the print. In a few seconds the image will appear and gradually increase in detail and density. As soon as it reaches the desired strength, pour the developer off into an empty bottle (labelled *Used Developer*), rinse the print in running water and immerse it in the fixing bath. This latter should be freshly made by dissolving sodium hyposulphite, 3 ounces, in water, 16 ounces. In this the print should be quietly rocked for ten or twelve minutes, after which it should be removed and thoroughly washed for an hour and a half in running water. It is important to note that more brilliant prints are obtained by covering the print during development; and that the tray used to contain the fixing solution should never be used for developing purposes.

**Enlargements by Artificial Light.**

To make enlargements on bromide paper by artificial light with home-made apparatus demands a certain amount of contrivance and preparation. Once the apparatus is made and put in working order, however, its use is as simple as the manipulations employed in enlarging by daylight. The following description of a home-made enlarging lantern and its use is condensed from Abbott's *Modern Photography* as peculiarly adapted for home use. Procure a good, sound box 14 inches square, and another 10 by 10 by 3 inches. Remove the cover of the larger box and hinge it so that it will serve as a door. At the centre of the opposite end of the box cut an opening large enough to hold a pair of condensing lenses, such as are sold for magic lantern work. The diameter of the condenser should be equal to the diagonal of the negative used ; its purpose is to gather the light and concentrate it upon the negative with uniform intensity at all points. Now cut a hole in the top of the box and insert an elbow of speaking-tube (tin), turning the horizontal piece with its opening toward the rear of the lantern. This will act as a chimney for the lamp or the illuminant used. Remove the cover from the smaller box and cut an opening in the bottom of the box a little smaller each way than the negative used. Around three sides of this opening attach grooved strips of wood so that the negative may be inserted and held close to the box. This smaller box is now attached to the larger one so that the negative comes exactly opposite the centre of the condenser and about three inches in front of it. In the larger box place a gas stand fitted with a Welsbach or other incandescent burner ; or we may use any good oil lamp with a silvered reflector behind the flame. The stronger and purer the light the shorter the exposure necessary. The gas supply can be secured by rubber-tube connection with the house supply. The flame of the lamp or gas fixture should be in line with the centre of the condenser. If we now light the lamp, close the door of the lantern, and insert the negative, we will see that the latter is very strongly illuminated all over. The back of the camera, with the ground glass removed, is fixed to the front of this lantern so as to enclose the negative completely. The joints between the boxes and camera are carefully covered by strips of black paper and the apparatus made practically light-tight. The conditions at this point are just what they were when we attached the camera to the opening in the window-shutter in enlarging by daylight. The table and box support for the sheet of bromide paper are arranged as before ; the lantern is placed at one end of the table, and the support for the enlargement at the other. The enlarged image is brought to the desired size and carefully focused ; the test for exposure made ; the lens capped and the sheet of sensitive paper fixed to its support facing the lens and exactly at the point of focus. The lens is uncovered, the exposure made, and the print developed as already described. It is unnecessary to say that, while the tests for exposure and the exposure itself are being made, the room must be absolutely darkened, and the sensitive paper handled with the same care that we would give to a plate before development.

When film negatives are to be enlarged from, either by daylight or artificial light, the manipulations are precisely the same as those employed with glass plates, except that the film must be enclosed between two pieces of glass free from all blemish.

Where expense is not to be considered as of importance a Cooper enlarging lantern, or a special daylight enlarging camera offers many advantages in convenience of manipulation. Among the many varieties of bromide papers obtainable those known as *Platino-bromide* and *Royal bromide* are perhaps the most desirable for pictorial purposes.

**Toning Bromide Prints.**

Sometimes, after we have enlarged a picture which, in its original form had given us pleasure, it will be apparent that in the larger picture we need the interest of color. The cold gray-black tones are not equally suitable for all subjects. This difficulty can be overcome by toning the prints according to the subjoined formulæ, for which I am indebted to Mr. E. A. Robins. The most permanent method of toning bromide prints is that of altering the silver of which the image is composed to silver sulphide. The substance is of a warm brown or sepia tint and is quite permanent in air, and it does not yield even to such a powerful bleaching agent as chlorine. The print must be carried farther in development than is usual, as toning tends to slightly reduce the intensity of the print. It should also be alumed after fixing and is then immersed, with or without previous washing, in the following bath: hypo, 2 ounces; alum (common), ¼ ounce; water, 15 ounces. The bath is heated to about 120°F. before the prints are immersed, and the operation should be conducted in a current of air or out-of-doors, as sulphur dioxide is given off and is very unpleasant. The prints tone slowly and gradually attain a sepia tone, which varies with the quality of the negative, a brilliant negative giving a richer sepia than a weak negative. After toning, the prints are washed and dried, any scum upon the surface being removed by a tuft of cotton wool and plain water or weak acid. Very fine effects can be produced with this bath upon "Royal" bromide paper, approaching carbon prints in quality.

The next most important toning bath is uranium, and although this is generally tabooed because of its so-called non-permanent qualities, if reasonable care be taken in the manipulations, no fault can be found with it in this respect. The bath that has produced excellent results in my hands is: potassium ferricyanide, 10 grains; water, 10 ounces; add—Acetic acid, glacial, 4 drams; uranium nitrate (10 per cent. solution), 2 drams. The mixed solution will not keep more than thirty minutes. Any tone can be produced from sepia to a Bartolozzi red. The print is afterward washed until all the yellow stain is removed, any left in reducing the permanency. Too much washing will remove all the tone, and as the process is one of intensification, the prints should not be too dark. If the uranium-toned print be immersed in the following solution a sea-green tone is produced, which has a very charming effect for seascapes and moonlight scenes — Ferric chloride, 15 grains; hydrochloric acid, ½ dram; water, 6 ounces.

Bromide prints can be toned to a Bartolozzi red by means of Schlippe's salt, or thio-antimoniate of soda. The print is first bleached by immersion in the following—Potassium bichromate, 20 grains; hydrochloric acid, 2 drams; water, 10 ounces. It is then washed until free from all the yellow stain, and flooded with a solution of Schlippe's salt, 15 grains to 1 ounce of water; the print at once assumes a Bartolozzi red tone, and only requires washing to complete the operation; this is also an intensifying process, and so the print must be kept fairly light, and all hypo must be washed out before toning. To obtain a brilliant blue tone the following process is available, and is quite permanent: To a 10 per cent. solution of ferric chloride add a 10 per cent. solution of potassium ferricyanide until no more precipitate is formed. This precipitate is dissolved by adding a 10 per cent. solution of potassium oxalate, giving a deep green solution quite clear, and in this the prints are immersed until the required tone is obtained.

If the action be too rapid it may be slowed by diluting with water. The prints are washed and cleared by flooding with a 2 per cent. solution of hydrochloric acid; they may be given a violet tone by placing in a 1 per cent. solution of ammonia.

**Copying.** After learning how to make enlarged prints from his small negatives, the amateur may profitably turn his attention to the copying of photographs and other pictures at home. The object to be copied may be an old Daguerreotype, tintype, or faded portrait, valued because of its associations, or it may be a painting, map, college diploma or manuscript we desire to reproduce. Again, we may want to make a slightly enlarged portrait of a single figure from a group. The work is very interesting and has few, if any, difficulties which cannot be easily overcome *provided that we can rack the bellows of our camera out beyond twice the focal length of the lens.* This is the principal difficulty in copying with a hand camera; its bellows' extension is so limited. As long as it is a question merely of making a small reproduction from a large original the difficulty does not appear. But when we attempt to make a copy the same size as the original (as to copy a 4 x 5 picture on a 4 x 5 plate), then we are confronted by the rule that *in such a case the distance between the lens and the original, and the distance between the lens and the focusing screen, must both be fully twice the focal length of the lens.* Thus, in copying a 4 x 5 picture upon a plate 4 x 5, we can readily adjust the distance required between lens and object, but it is impossible to focus the image sharply because we cannot rack out the bellows far enough to give the required distance between lens and focusing screen. If we have a double-extension its extra length of bellows will help us out of the difficulty. Failing this, a short-focus (wide angle) lens fitted to our regular camera may enable us to get the desired size and sharpness in our copy. Or, if we do not possess either of these, we may make a wooden extension front and fit it into the front-board of our hand-camera in the place usually occupied by the lens. The lens, of course, must be fixed at the front end of this light-proof wooden extension front. In this way we gain the desired distance of separation between the lens and plate. A still simpler plan is to make use of a supplementary lens, such as the *Ideal Copying Lens*, which, slipped on at the hood of our regular lens, will shorten its focal length and so enable us to solve the problem.

The original to be copied is fixed in a vertical position near a window which faces an unobstructed north light. The lighting should be directed to evenly illuminate the whole of the picture to be copied, and we must be careful to avoid reflections, or any defect in lighting which will cause the grain or texture of the original to be too prominent. It is also essential that the centre of the lens be in line with the centre of the original being copied, and the original absolutely parallel with the plate. The camera may be fixed to its tripod or placed upon boxes on a table; the first method is the best as obviating any possibility of movement during the immediate preparations before exposure. Focusing should be done with the largest stop, and a smaller stop inserted before exposure. In focusing we must look especially to the corners of the plate, to see that they are well lighted and that the definition there is as good as at the centre of the plate. The exposure, in a fairly bright light, a plate of medium rapidity and stop *f*/32 will range from 35 seconds to 5 minutes according to the subject and the amount of enlargement or reduction. Copies of printed matter will require exposure according to the condition and tint of the paper, thus a yellowed engraving will require three times the exposure given to a page from a new hymn-book. In copying manuscripts or any object having color a slow orthochromatic plate, or a ray-filter, offers practical advantages. The latter, used with a plain plate, is especially valuable in copying blue prints. A full exposure is always preferable to one slightly undertimed. In development, the points to be attended to are intensity and contrast. The grayness of tone peculiar to copied photographs is generally due to the want of intelligent development. Rodinal, tolidol, and hydroquinone have all proved valuable in my own experience in this work. A good formula is as follows, A: Hydroquinone, 75 grains; sodium sulphite, 2 ounces; potassium bromide, 15 grains; water, 8 ounces. B: Caustic soda, 180 grains; water, 10 ounces. For use, take 2 ounces of A and add a quarter ounce of B. Dilute with water as the plate may indicate after the appearance of the image.

Let us now take up two or three printing methods which are peculiarly suitable for our use in winter-time

**Printing Methods.**

when the light is dull. The question is sometimes asked: Is it possible to make prints on printing-out paper, such as *Solio*, by artificial light. It is possible if we have a light of great intensity, such as the electric arc, but it is not practical with the illumination ordinarily available at home. A practical method for rapidly making print-out prints on dull days is as follows: Expose a piece of print-out paper under the negative as usual by daylight until the image is just faintly visible. A minute's exposure will do this if we have sunlight. When a number of faintly printed pictures have been made in this way during the day, we may develop them at night to any desired degree of density, toning and fixing them afterward as usual.

When ready to begin development, rinse the print in water so that it will lay flat in the tray. Now flow over it the developer, made as follows: Tolidol, 15 grains; citric acid, 30 grains; water, 4 ounces. In this bath the print will rapidly gain the strength required, and will have the same color as if it had been fully printed out. As developed prints bleach less in toning and fixing than fully printed-out prints, they should not be developed much, if any, further than they are desired when finished. After development the prints should be well washed to free them from all traces of acid. They may then be toned in any of the usual toning baths as, for instance: Take of gold solution (made by adding 15 ounces of water to 15 grains of gold chloride), 1 ounce, and add 20 ounces of water. This gives us a bath containing 1 grain of gold in 20 ounces of water. Make this bath *slightly* alkaline by adding powdered borax until a piece of red litmus paper placed in the solution turns blue. In this bath the developed and washed prints will gradually acquire a purple-brown tone when looked through before a window. Now wash them in two changes of water, and fix for fifteen minutes in hypo, 1 ounce; alum ¼ ounce, and water 20 ounces. Keep the prints in motion in this bath, and afterward wash in running water for half an hour.

**Positive Films.** Positive celluloid films, such as those made by Fitch, Seed and Carbutt, may be employed to advantage in the preparation of photographic greeting cards or souvenirs. These films are thick, medium, or thin sheets of white celluloid coated with a sensitive emulsion, and give charming prints in black, brown, and olive tones when intelligently handled. They are, of course, to be manipulated only in ruby light until the moment of exposure, when they are protected except where covered with the negative. Artificial light of any kind may be used for their production (I use my Carbutt dark-room lantern for the purpose), and they are finished when developed and fixed, as a negative is.

To use them we open the package in ruby-light and take out one piece. This is placed face to face with a negative of medium density in a printing-frame, just as we do with printing-paper. The film side of the positive film may be discovered by touching it with the moistened finger-tip. When the sheet is secured in the printing-frame, and the opened package closed and put away, we open our dark-room lantern, exposing the light of the lamp. The exposure varies with the kind of light used and the character of the negative. With an average negative the exposure will be between ten and twenty seconds one foot from a No. 2 kerosene burner. Under-exposure with a flat negative will give gray tones, as will also over-exposure and necessarily short development.

Almost any clear working developer will give good results, but the following is recommended as yielding good blacks: A. Water, 8 ounces; metol, 15 grains; hydroquinone, 15 grains; sodium sulphite (dry), 60 grains. B. Water, 8 ounces; potassium bromide, 8 grains; sodium carbonate (dry), 60 grains.

If the crystallized sulphite and carbonate are used, take twice as much of each as the formula calls for. To develop, take equal parts of A and B. The developer should be about 70° F., and can be used repeatedly. It improves with use, but should be discarded as soon as discolored, as it will then stain the film. Development should not take more than a minute. Under-exposure and long development tend to stain the whites. When prints are to be toned, carry the development a little farther than for black tones.

For fixing, a plain solution of one ounce of hypo soda in five ounces of water can be used, but it should not be used after it is at all discolored. The following fixing bath is better, especially when prints are to be toned, as it will harden the film and prevent blistering in the subsequent toning bath: A. Water, 32 ounces; hypo, 8 ounces; sodium sulphite (crystals), 1½ ounces. B. Powdered common alum, 1 ounce; water, 8 ounces. C. Citric acid, ¼ ounce; water, 5 ounces.

Of the above stock solutions take four ounces A, one ounce B, and while stirring vigorously add slowly enough of C to dissolve the precipitate formed. The mixed bath will keep in a bottle, but should be filtered occasionally, and not used when very old. Whichever bath is used, prints should be fixed for at least fifteen minutes. For black tones, after fixing, wash well. The permanency of the prints depends upon thorough fixing and washing. They must be washed more thoroughly than paper prints. Wipe the surface of the prints lightly with wet absorbent cotton and pin or hang up to dry.

If warm tones are desired use the following toning bath: Hypo, 4 ounces; water, 32 ounces. Heat nearly to boiling and add powdered alum, 1 ounce.

Do not filter this solution, it improves with age and by being reheated repeatedly. After making allow it to cool. After fixing and rinsing prints, place them in a part of the toning bath which is at the temperature of the room, for about ten minutes, and then into a part heated to about 120° F. (not much higher). After toning, put the print again into a cool bath for a few minutes and then wash, but do not touch the surface of the prints with fingers, or allow running water to strike it. After washing *thoroughly*, wipe the prints lightly with a tuft of wet absorbent cotton and pin up to dry.

A very pleasing effect is obtained by giving a slight warm tint to a somewhat dark print. Prints which have been fixed, washed, and dried, can be afterward toned with good effect.

If twenty-four ounces of water are used instead of thirty-two ounces in the above formula, and the bath is heated to about 95° F., instead of 120° F., it will tone considerably slower, but the results on the whole are better.

On account of the extreme delicacy of these prints, we must see that all trays, solutions, etc., are perfectly clean, and that the developer is absolutely clear in order to avoid stains and discoloration. The finished prints may be tastefully mounted, if desired, on appropriately tinted boards. Fish glue is the best mountant, and the appearance of the prints will be improved if we trim the edges on a bevel to give a narrow white line about the picture.

**Sensitol Prints.** A simple method for obtaining prints from portions of favorite negatives on handkerchiefs, cushion covers and other fabrics, fancy wooden and leather articles, post-cards, note-paper and menu-cards has long held a prominent place among the amateur's wants. The processes generally advised, though practical, are of limited application and tedious in their manipulation. For this reason I make room for particulars of two sensitizing solutions recently introduced, known as *Sensitol* and *Panak*, which the amateur will find very useful in his at-home work.

Sensitol (or Panak) can be applied by gas or lamp light, or by very weak daylight, but the sensitized material must be dried and kept in a dark place that is free from moisture.

A tuft of cotton is fastened over the end of a medicine-dropper by means of a small rubber band, and is then moistened with the solution. Squeeze the air out of the tube and allow it to fill up with sensitol. This is then used as a brush, affording a constant even flow of the solution over the object. A rubber-bound camel's-hair brush may be used if preferred. Simply cover the surface of the spot where the picture is to be printed ; one coating is usually sufficient. When dry it is ready to be printed.

**Coating Paper.** To decorate stationery or menu-cards, cut the design (square, oval, heart, triangle, etc.) out of some opaque paper to mark your negative with when printing, or simply coat the shape of your design in sensitol, making as few strokes as possible. Take up any surplus sensitol by touching the edge of the design with a blotter. The platino-glycerine toning bath and *Tonfixol* are of special value in note-paper photography, on account of their simplicity of manipulation.

To make prints which are indistinguishable from platinotypes, it is necessary to get either a waterproof drawing paper or the platinotype paper stock and give it two coatings with arrowroot before applying sensitol. This entails a little extra work, but the result certainly justifies it. Ready-sized platinotype paper does not require the application of arrowroot. The arrowroot size given in the last number of THE PHOTO-MINIATURE is suitable for this purpose. If the paper looks streaky after the first application of sensitol a second application in the opposite direction will generally remedy it.

**Sensitizing Fabrics.** All fabrics should be washed thoroughly with soap and hot water to remove starch and other soluble matter (which is found especially in new goods) and allowed to dry before sensitol is applied. Lay the fabric on a clean piece of glass. Apply sensitol to the place where the picture is desired, and dry in the dark. When dry the fabric may be removed from the glass and all put into the printing frame. This applies to linen and all fabrics except silk.

Silk sensitol is a two-solution sensitizer especially adapted to making pictures on silk and satin, although it will also work well on any other absorbent surface. It is essential if we wish to print on very thin silk, such as light silk handkerchiefs, etc., which have not body enough to absorb a sufficient quantity of the single solution sensitizer.

**Printing, Toning, etc.** Printing both with paper or fabrics should be continued in sunlight until the shadows are quite brown and the details in high lights are shown. After making a test print from the negative on a piece of scrap fabric or paper, we will soon be able to judge when a print is dark enough by simply observing the color from the front without opening the frame. The general method of treatment is similar to that of printing-out paper: the print is made in sunlight and then toned and fixed in any good bath (formulæ are given below). After printing, place the picture in running water for at least ten minutes, or until the yellow stain has been removed. Then tone in any of the following baths. This stain can be removed before toning by immersing the print, after it has been washed, in a solution of citrate of potassium made acid with citric acid (citrate of potassium, 1 ounce; citric acid 50 grains; water, 3 ounces). Then wash well in running water before toning.

For a quick method of obtaining a rich purplish black tone use: A. Gold chloride, 15 grains; water, 8 ounces. B. Sulphocyanide of ammonium, 1 ounce; water, 16 ounces. Shake A well and pour into B. The solution becomes muddy but will clear up in a few hours. When the print is toned rinse it well and fix in water, 20 ounces; hypo, 1 ounce. After fixing, wash prints well before drying.

In some cases it will be found impossible to wash all the yellow stains out of the print before toning. After the print is toned and fixed the cloth will have a decided yellow tint wherever the sensitol has been applied. This is probably caused by impurities in the cloth which are insoluble in water, acting on the sensitol, and can be easily removed by immersing print in water containing about 2 per cent. of hydrochloric acid, and afterward rinsing it through clear water and then neutralizing it in a bath containing from 5 to 10 grains of bicarbonate of soda to the ounce, and again rinsing in clear water.

Sensitol prints are said to be permanent, and cloth prints may be washed in soap and water without injury.

*Self-Toning Linen Fabric* is another means at our disposal for obtaining prints on linen. This is a print-out emulsion on a linen support, and is flexible, but cannot be folded. *Vinco Linaura* is still another sensitized fabric of the same kind, but is a development and not a print-out emulsion. Its manipulation is the same as that given for development papers hereafter.

**Development Papers.**

For making prints at night by artificial light the amateur's needs are most completely filled by the many varieties of modified bromide papers now in the market. *Velox*, *Azo*, *Dekko*, *Vinco*, *Kruxo*, and *Cyko* are American papers of this class; in England *Velox* and *Gravura* are popular. These papers are slow bromide papers and may be handled and manipulated in weak daylight, lamplight, gaslight, and electric light. This is their great advantage over the regular sorts of bromide paper which more closely approximate the dry-plate in sensitiveness, and cannot, therefore, be manipulated except in ruby light.

Slow bromide papers are sometimes spoken of as developing papers, because the picture image does not print out on exposure, but requires development just as when we make a negative. I mention this because I have known amateurs expose development papers in their printing-frames for days, patiently waiting for the picture to print out as with the familiar printing-out papers to which they are accustomed.

Developing papers are obtainable in great variety of thickness, surface texture, and other minor peculiarities. Each variety has its own individual qualities, but the manipulation of all is practically the same. The paper is placed face down on the negative in a weak light (daylight or gaslight, etc.) in the printing-frame, well protected by pads behind. The frame is then exposed, with the negative toward the light, to a window facing north for from one to six seconds if daylight is used ; or from ten seconds to two or three minutes at a distance of one foot from a gas-jet.

**Exposure.** The exposure varies according to the density of the negative, the intensity of the light, and the distance between light and negative. Some varieties of paper are more sensitive than others, thus *Special Velox* requires less exposure (about one-quarter less) than *Ordinary Velox ; Vinco* is more rapid than some of the other sorts. This detail can be mastered, as far as any particular variety of paper is concerned, by making a few tests with strips of the paper. With artificial light, using the same negative, the various lights may be approximately compared as follows : Welsbach gaslight—strongest ; incandescent light—about one-half as strong as Welsbach gaslight ; ordinary gaslight—slightly weaker than incandescent light ; oil-lamp of ordinary size—about one-third as strong as an ordinary gas-burner.

On account of its uniformity, artificial light is recommended in preference to daylight, as once the amount of exposure with a given artificial light is ascertained, it becomes easy to approximate the amount of time necessary to properly make subsequent exposures ; the only variation of time which it is necessary to make being that required by the variation in density of different negatives.

Negatives with great contrasts require double the exposure needed for normal negatives, and the developer should be diluted with half its bulk of water. Negatives which lack contrast may be given a shorter exposure, and contrast obtained in the print by using the developer at its full strength, adding a few drops of a ten per cent. solution of potassium bromide to keep the whites of the print clear.

**Development.** After the exposure the print is removed from the printing-frame away from the glare of light, and immersed in clear water. This will make the print limp, and insure the uniform action of the developer. As developer we may use metol-hydroquinone, tolidol, or amidol, the first being preferable. The formula for *metol-quinol* developer is as follows : Water, 10 ounces ; metol, 7 grains ; sodium sulphite, crystals pure, ½ ounce ; hydroquinone, 30 grains ; sodium carbonate, desiccated, 200 grains (or 400 grains of crystallized carbonate) ; 10% bromide of potassium solution, about 10 drops.

A good *amidol* formula is : Water, 4 ounces ; sodium sulphite (crystals pure), 200 grains ; amidol, about 20 grains; 10% bromide of potassium solution, about 5 drops.

If blacks are greenish, add more amidol ; if whites are grayish, add more bromide of potassium. Slow development gives better details and is easier to control.

Tolidol gives very pleasing prints with most of the developing papers. A satisfactory formula is as follows : Water, 16 ounces ; tolidol, 80 grains ; sodium sulphite (dried), 360 grains ; sodium carbonate (dried), 240 grains.

This developer can be used full strength or slightly diluted with water.

Sodium sulphite and sodium carbonate referred to in above formula are dried. If crystals are used take twice the amount of sulphite and two and one-half times the amount of carbonate. Always use C. P. (chemically pure) chemicals.

With some papers, and according to exposure, the picture image will appear in a few seconds, and quickly reach the desired density. The use of potassium bromide helps us to regulate development within limits, but must be done carefully. We may develop in a tray, or support the exposed print on a piece of glass and swab the developer over the print, with a wad of canton flannel folded several times around a strip of wood, using a straight up-and-down motion. As soon as development is completed, the print is rinsed in water and immersed for fifteen minutes in an acid fixing bath, made up as follows : Hypo, 16 ounces ; water, 64 ounces. Then add the following hardening solution : Water, 5 ounces ; sodium sulphite crystals, ½ ounce ; commercial acetic acid (containing 25% pure acid), 3 ounces ; powdered alum, ½ ounce.

This hardening solution may be left out, but the surface of the prints may then remain rather soft and the hypo bath will soon discolor, and is then liable to stain the prints.

With the hardening solution this mixture keeps perfectly clear and can be made up at any time in advance.

The prints must be kept moving in this solution until thoroughly fixed, after which they should be well washed in running water, for from thirty minutes to an hour.

In addition to the usual varieties of paper, development emulsions are now coated on double weight (extra thick) papers, linen and on postal cards. The advantages of these for special purposes will be evident.

Here I must make an end of our survey of photography at home. Looking over what has been written I find that many things have been left untouched, simply because to tell of everything would require a book bulkier than a *British Journal Almanack.* Sufficient has been said, however, to show that photography is just as much a winter hobby as a summer pastime. Other branches of at home work, such as lantern slides and transparencies, development, the "blue print" methods and their variations, will be dealt with in THE PHOTO-MINIATURE before the winter passes. Meanwhile the subjoined list of books, offering information of value to the home worker, will be useful.

## BOOKS.

*Amateur Portraiture at Home.* By F. Dundas Todd. 78 pp. With many illustrations. A practical little book. Paper covers, 75 cents.

*Portraits by Flashlight.* By F. W. Guerin. 57 pp., profusely illustrated. Written for professional workers. Cloth, $1.50.

*Photography Indoors and Out.* By Alexander Black. 240 pp. Illustrated. For Amateurs. Cloth, 75 cents.

*The Perfect Negative.* By F. C. Lambert. 134 pp. Illustrated. A very complete handbook on intensification and the treatment of negatives *after* development. Cloth, 50 cents.

*Artistic Lighting and Flashlight Portraiture.* By F. Dundas Todd and James Inglis. Illustrated. Cloth, $1.00.

*The Pose in Portraiture.* No. 2. THE PHOTO-MINIATURE. 25 cents.

*Practical Enlarging.* By John A. Hodges. 134 pp. With diagrams. Cloth, 50 cents.

*Home Portraiture for Amateurs.* By R. Penlake. 140 pp., illustrated. Cloth, $1.25.

# NOTES

*May we offer our readers all the Compliments of the Season and a Prosperous New Year?*

◆

The December number of THE PHOTO-MINIATURE, dealing with *Lantern Slides* and *Transparencies*, will be published early in January, and will be followed, as quickly as possible, by the January number, which will be devoted to *The Blue Print and its Variations*.

Several friends have written mentioning a report (in Pittsburg and Cleveland) that THE PHOTO-MINIATURE had "gone up." The rumor is hardly worth mention, but we have pleasure in taking the opportunity to assure our readers that when THE PHOTO-MINIATURE "goes up" we will promptly notify everybody at all likely to be interested in the event.

Meanwhile we are increasing our regular edition, and have ordered reprints (2,000 copies each) of THE PHOTO-MINIATURE, Nos. 3 and 4, dealing with *Hand Camera Work* and *Photography Outdoors*.

◆

Don't overlook the camera when selecting holiday gifts for your friends. It would be difficult to choose a more acceptable present, whether the friend is an amateur or only a would-be amateur. The Ray Camera Co., Rochester, N. Y., announces an attractive specialty in this line—the *Ray Special Folding Camera* at $7. This concession in price continues only until January 1st, and the opportunity is one worth grasping.

◆

February 11, 1900, will be the centenary of the birth of Fox Talbot, one of the "fathers of photography." *The Photogram*, of London, has inaugurated a series of papers dealing with his life and labors, in commemoration of the event, the first paper of the series appearing in the December number.

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The same number contains an interesting sketch by Thomas R. Dallmeyer, of Dr. P. H. Emerson, which is illustrated by a portrait of the famous author of "Naturalistic Photography" and its "Renunciation."

❧

The first exhibition of the Portland (Me.) Camera Club, held November 23d to 25th, was most successful. It comprised 202 exhibits of amateur work indoors and out, many of which were decidedly above the average in pictorial quality.

❧

Judging from the many inquiries we receive concerning telephotography, Mr. Thomas R. Dallmeyer's book on the subject, to be ready in a few weeks, will be widely appreciated. We are glad that the first book on this subject is from the pen of Mr. Dallmeyer, who was the first to introduce the telephotographic lens itself. The work will bear the title *An Elementary Treatise on the Construction and Application of the Telephotographic Lens*, and will be fully illustrated with 26 plates and 66 diagrams. In his preface the author says: "This treatise is addressed to those who practise photography, either for pictorial or scientific ends. The author has endeavored to present the subject of Telephotography in a manner which presupposes only the very slightest acquaintance with the science of optics, explaining fully only those few properties or functions of lenses which are necessary to enable the photographer to understand the action of the telephotographic lens, and to comprehend the possibilities of its applications." The price of the book is $4.00 net. *Now Ready.*

❧

The increasing demand for an extremely rapid plate for winter work has prompted the Hammer Dry Plate Company, St. Louis, to introduce a new plate, their *Special Red Label*, for this purpose. The new plate is not only fast, but good, and our work with it, using *Tolidol* developer, has given us every satisfaction.

❧

The Edinburgh (Scotland) Photographic Society announces its annual exhibition, to be held February 10

# *A FEW GOOD BOOKS*

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## THE PERFECT NEGATIVE

A series of chapters on the after treatment of the negative—intensification, reduction, etc. By Rev. F. C. Lambert 135 pp., illus., cloth, 50 cents.

## THE PLATINOTYPE PROCESS

A practical handbook, with facsimile prints before and after development. By W. J. Warren. 50 cents.

## PLATINOTYPE PRINTING

Written from the pictorial standpoint; illustrated. By A. Horsley Hinton. Cloth, 92 pp., 50 cents.

**PHOTO-AQUATINT or The Gum-Bichromate Process.** The authoritative manual on this subject. By Maskell and Demachy. 55 pp., 50 cents.

## THE GUM-BICHROMATE PROCESS

A later manual than the above. Written by a practical worker. Illus. by W. J. Warren. Cloth, 50 cents.

## CARBON PRINTING

By E. J. Wall. Fifth edition, with a chapter on the Ozotype Process. Carbon frontispiece. 50 cents.

## CHEMISTRY FOR PHOTOGRAPHERS

Practical information, plainly written. Second edition. By Chas. F. Townsend. 158 pp., 50 cents.

## PRACTICAL PICTORIAL PHOTOGRAPHY

The best book on picture making by photography. Very fully illustrated. By A. Horsley Hinton. In two parts, cloth bound. Per volume, 50 cents.

## THE BARNET BOOK

A collection of selected papers by well-known men. Capt. Abney, Chapman Jones, C. H. Bothamley, Harold Baker, A. Horsley Hinton, J. A. Hodges, Andrew Pringle, F. C. Lambert, etc. 287 pp., cloth, $1.00.

## PRACTICAL REFERENCE BOOK

**Of Photography.** By F. Dundas Todd. In two parts. Very full of useful information, boiled down for ready reference. Per part, 50 cents.

*Send for our Complete Book List*

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to 24, 1900. There are two classes open to the world: I., for landscapes, seascapes, and architecture; II., for portraiture, figure, and animal studies. Gold, silver, and bronze medals are offered in each class. Entries and exhibits should reach the secretary of the society, Mr. J. S. McCulloch, 102 George Street, Edinburgh, before January 29th.

❧

*La Photographie Animée*, by E. Trutat, is the latest book published dealing with animated photography. It is published by Gauthier Villars et Cie., Paris, at $2. This is the fourth work upon this application of photography, of which "Living Pictures" by Hy. V. Hopwood, published a few months ago, is perhaps the most complete for the English reader.

❧

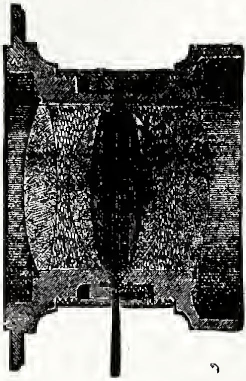
*Columbia Matt* is a new collodion printing-out paper for platinum and carbon effects, introduced by the American Self-Toning Paper Company, of Newark, N. J. When toned with the special platinum solution made by the company, we find that this paper gives rich prints with a fine gradation of color throughout the half tones and shadows.

❧

Mr. Sam. C. Partridge, of San Francisco, recently developed some two dozen Cramer plates exposed during an eastern trip made in 1888. Despite the eleven years between exposure and development (the plates had been packed away and forgotten), he obtained negatives equal in every respect to those usually obtained from freshly exposed plates. This is a remarkable showing for the keeping quality of the Cramer plate and deserves record.

❧

*The Photographic Times*, in association with the Doubleday & McClure Co., announces a competition with attractive features for amateur and professional photographers. Five prizes ($175 in cash and 5 medals) are offered for the best series of photographs illustrating three recent novels named in the prospectus. The competition closes June 1, 1900. Full particulars may be had from the *Photographic Times*, New York.



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*Tolidol Talks* is the title of a capital little book on photographic manipulation just issued by the Haller-Kemper Co., of Chicago, for free distribution. In simplicity of instruction and amount of practical information, it excels any trade booklet we have seen except the *Aristo Manual*, put out by the American Aristo Co., Jamestown, N. Y. Readers of THE PHOTO-MINIATURE should have both these booklets at hand for ready reference.

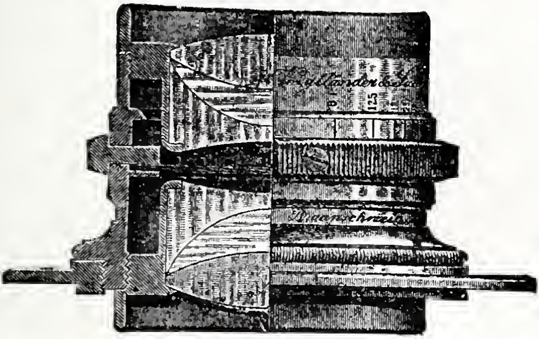
◆

The Case Library, of Cleveland, O. (Case School of Applied Science), held its fourth annual exhibition of amateur photography a few weeks ago. Over 400 prints were displayed upon the walls of the exhibition, chiefly the work of Ohio amateurs. The standard of quality throughout was surprisingly high and the exhibition was warmly appreciated by all who visited it. A pleasing feature was the collection of photographs loaned (not for competition) by F. Holland Day, Miss Eva Lawrence Watson and Mr. Clarence H. White.

◆

The American Institute Photographic Salon, held at the new gallery of the Institute, New York, during the early part of December, was altogether the most interesting exhibition so far given by this oldest of American photographic societies. Over 300 prints were shown, sent by 113 exhibitors, of whom 45 were Americans, 60 British, 5 German, and 3 French. The picture of the exhibition was a large "bi-gum" print in two colors, titled "'Tis not Solitude"—a woodland scene in subdued tones, by the brothers Hofmeister, of Hamburg. The British collection, gotten together by H. Snowden Ward, of London, contained examples of all classes of work by the principal exhibitors at English exhibitions. The display of professional portraiture by such men as Hollyer, Werner, and Mendelssohn, which formed part of the British collection, was decidedly interesting. The telephotographs of birds in their natural haunts, sent by R. B. Lodge, also deserve mention.

Among the exhibits by American workers the number of examples sent by professionals was unusually large. Among these we noted portraits by W. B. Dyer, Miss Mathilde Weil, Miss Ben Yusuf, Rudolph Eickemeyer,



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Jr., Pirie MacDonald, Selby and Nixon, Miss Frances B. Johnston, Alfred Holden, H. H. Pierce, Hy. Histed, J. C. Strauss, and G. H. Van Norman. Contrasting the American with the English portraiture we were pleased to see that the American examples showed a keener appreciation of the essentials of portraiture than the examples sent from Great Britain. The outdoor pictures, as a whole, were very uneven in merit, and inclined to be "odd and freakish" as far as printing was concerned. Rudolph Eickemeyer's pictures offered the best individual collection, but seemed to consist wholly of examples seen at many previous exhibitions.

The exhibition was well attended and, in that sense, most successful. Dr. J. W. Bartlett and Mr. H. Snowden Ward are to be congratulated upon their work.

◆

Among recent trade introductions and changes we are advised by the Eastman Kodak Co. that the price of their *Flash Sheets* has been reduced from 40 cents to 25 cents per package of six sheets. Also that they have introduced spool films for two and six exposures—a convenience for amateur workers at home who desire to use their film cameras for a few exposures only at a time. Another Eastman novelty is *Sepia Paper*, a new printing-out paper giving warm brown tones with all the simplicity of manipulation hitherto possessed exclusively by "blue-print" paper. These specialties will undoubtedly have a wide popularity as they become known.

◆

The question of a safe and convenient means of preserving prints is one of much importance to the amateur. We have never had much affection for the regulation view album, which is too often clumsy in make-up and lacks taste in its appearance. A new series of *Flexible Albums* sent to our table by the Samuel Ward Company of Boston, completely removes our prejudice. These albums are convenient to handle, have a generous capacity without bulk, are flexible and neatly bound. The leaves are of *Puro* paper—a chemically pure paper originated by this company—steel gray, cream or dark gray in tint, and of desirable thickness. We have pleasure in bringing these albums to the notice of our readers.

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Three photographs presenting three good reasons why GRAY'S DOUBLE STIGMAT is The Lens to buy this spring, mailed free to those interested.

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A new *Double Anastigmat*, Series IIa., has been introduced by the firm of C. P. Goerz, of Berlin and New York. This is a symmetrical lens working at *f*/5.5, and has an efficient angle of 75° on the plate for which it is listed. The two combinations of the new lens may be used separately if desired, each combination being fully corrected. We presume that the new anastigmat will be obtainable on this side of the water at an early date. It will be much appreciated by those familiar with the *Double Anastigmat*, Series III. and IV., and its greater speed is an additional point in its favor.

❧

Those who have so long found satisfaction in the specialties manufactured by the American Aristo Company will be interested to learn that this company has just introduced a *self-toning collodion* paper which combines beauty in results with great simplicity in manipulation. We recommend it to our readers as a convenience for quickly obtaining prints. The formula supplied with the paper will be found to give very pleasing tones.

❧

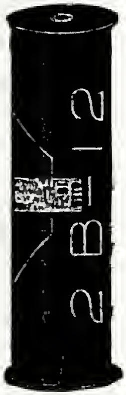
*The British Journal of Photography* for December 15th has a capital paper, by the editor, dealing with the use of the metric system of weights and measures in compounding photographic formulæ. It should be seen by those interested.

❧

Lantern plates, with which lantern slides may be made by gaslight in a manner similar to the manipulation of *Velox* and other development papers, are being introduced extensively in England. A favorite plate of this class is Griffin's *Gaslyt* plate, which, we hear, will shortly be obtainable on this side.

❧

A simple, one-solution sensitizer, which may be applied to almost any well sized material, is given by M. Niewenglowski as follows: Distilled water, 10 parts; silver nitrate, 3 parts; uranium nitrate, 30 parts; absolute alcohol to make up to 100 parts. Apply the solution with a broad camel's-hair brush to avoid streakiness, and allow the sensitized material to dry in the dark. Print in the usual way and fix the print by immersion in two



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or three baths of water acidulated with nitric acid. Wash well afterward, and dry in front of a fire, or with a hot flat-iron. The tones so obtained are of a warm black color.

❧

A handy developing machine has been placed upon the British market which permits of the development of two dozen negatives in twenty minutes. What a bonanza for the man who advertises: "Developing for amateurs a specialty; reduced tariff for failures"! A larger machine has a capacity for fifty plates. Films or prints may also be manipulated in this manner if desired. The possibilities make one shiver.

❧

It is sometimes found that negatives reduced with ammonium persulphate exhibit red fog after a little exposure to light in the printing-frame. This is due to the silver remaining in the film after reduction, and may be removed by thoroughly wetting the negative, immersing it in the usual hypo-soda fixing bath for a few minutes, and finally well washing.

M. Hassreidter advises a two and a half per cent. solution of ammonium persulphate as better for reducing negatives than the five per cent. solution usually advised. The reduced negative should invariably be returned to the fixing bath before the final washing.

❧

*Western Camera Notes* is a new photographic journal, published monthly at 60 cents per year, by C. F. Potter, Jr., Minneapolis, Minn. No. 1, December, 1899, presents a tasteful appearance and includes some interesting amateur experiences.

❧

J. H. Dallmeyer, Ltd., announce a new *Stigmatic* lens, Series III., *f*/7.5, to meet the requirements of those who seek an objective with the speed of a good rectilinear, possessing the advantages of a modern anastigmat, and moderate in price. The new lens is not convertible, *i.e.* must be used intact, and is extremely light and portable, being thus adapted for hand-camera work. Messrs. E. & H. T. Anthony & Co., New York, are the agents for this lens in America.

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In a recent number of the *Mitteilungen*, Dr. E. Vogel points out that the dye aurantia, like the bichromates and some modern developers, acts with some persons as an irritant poison, giving rise to painful eruptions of the skin. The fact should be noted by those who have occasion to use this dye in orthochromatic photography, the making of " color-screens " and the like.

❧

Among the minor conveniences provided for amateur photographers in Europe are " sets " of auxiliary or supplementary lenses which may be combined with the ordinary hand-camera lens, and thus afford a ready means of shortening or lengthening the focal length of the lens for near or distant objects, enlargement, etc. These " sets " are inexpensive and extremely useful. Why does not some enterprising American optician put a similar " set " on the market here ? It would have a wide popularity if introduced at a reasonable figure.

❧

The second Traill-Taylor Memorial Lecture, given by Major-General J. Waterhouse before the Royal Photographic Society some weeks ago, dealt with the *Teachings of the Daguerreotype*. It contains many valuable suggestions, and should be seen by all interested in photography from the theoretical standpoint. The paper is reprinted in this country in *Wilson's Photographic Magazine* for January, 1900.

❧

In a recent paper on pictorial photography Mr. A. Horsley Hinton advised the use of a slow isochromatic plate and platinotype paper as means whereby the most pleasing results could be obtained. He also described his method of printing without a printing-frame, by means of a stout board covered with cloth. On this the paper, with the negative, is laid, the position of the negative being fixed by six stout pins, two on each of three sides of the negative, passed through the paper and cloth into the board. This allows the negative to be moved bodily, and the whole of the print examined at one time. The method, of course, is intended chiefly for use in the making of large prints on rough papers, where absolute sharpness is not essential.

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In announcing the retirement of Louis Prang from active business, the Boston *Sunday Globe* of November 10th gave a lengthy and extremely interesting account of the life-work of this famous lithographer and publisher of art prints. It may be justly said that, during the past half century, Louis Prang has done more than any other individual worker for the education and improvement of "the public taste" in matters of art in this country. The account of his work given in the *Globe* is therefore worthy of mention.

❧

The Detroit (Mich.) Camera Club held its third annual salon and exhibition at the club-rooms, November 25th to December 3d. The display in both sections comprised 288 prints sent by amateurs and professionals from all parts of the Union. The grand prize of the salon was awarded to W. D. Murphy, of New York, for his picture *In the Lutschenthal, Switzerland;* and the diploma for the best picture in the general exhibition was secured by A. D. Noble, Jr., for the picture *A Quiet Day.*

❧

An exhibition of photographs in natural colors, made by the McDonough process, was given at the Waldorf-Astoria, New York, during November, by the International Photo-Color Co., of Chicago. The exhibition was well attended by many of the most prominent photographic workers of the metropolis, and the pictures were received with enthusiasm. Views in New York City (Dewey Parade), in Europe, and in Egypt were shown, many of them the results of "first attempts" by amateurs to make use of this process, which gives the color record of a scene with a single exposure. Critically considered the exhibits were uneven in merit, but the possibilities of the method in hands familiar with its manipulation were plainly evident and excited much interest. Mr. Dwight K. Tripp, the president of the company, was present to receive friends and inquirers, and the pictures were explained by Mr. Charles H. Crewdson.

❧

*Photographic Mosaics, 1900.* An Annual Record of Photographic Progress. Edited and published by Edward L. Wilson, 289 Fourth Avenue, New York. 288

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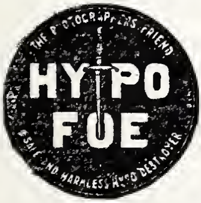

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A little year-book—"it fits the pocket"—but packed full of practical information and attractive pictures, *Mosaics* is emphatically the best of annuals for the man or woman following photography as a profession. For the same reason it is a useful book for the earnest amateur. It gives a very complete record of the experiences of the year in various branches of photography; an interesting collection of engravings showing the best work of American photographers during the year; and a number of suggestive papers dealing with practical photography.

◆

*The International Annual of Photography for 1900.* Edited by W. I. Scandlin. Published by E. and H. T. Anthony & Co., New York. 310 pp., profusely illustrated throughout. Paper covers, 90 cents.

Substantial in bulk and in quality, the *International Annual* is an old favorite. Its contents give us views and opinions by practical workers in the new world and the old; its pictures (one on almost every page) show us how interestingly various are the applications of modern photography. Mr. Scandlin has this year secured many unusually helpful contributions, and we have dipped into the pages of the book, again and again, with increasing pleasure.

◆

*The American Annual of Photography for 1900.* Edited by Walter E. Woodbury. Published by the Scovill & Adams Co., New York. 370 pp., with photogravure frontispiece and 300 illustrations. Paper covers, 90 cents.

Always remarkable for the number and beauty of its illustrations, the new volume of the *American Annual* is this year more interesting, pictorially, than ever before. It must be seen to be appreciated. The articles are by contributors familiar with many uncommon fields of work, and will be found fruitful in new ideas. Mr. Woodbury deserves congratulations upon the production of a book so full of diversified interest.

◆

The demand for copies of *Photograms of the Year 1900* and *Penrose's Pictorial Annual* was so great that

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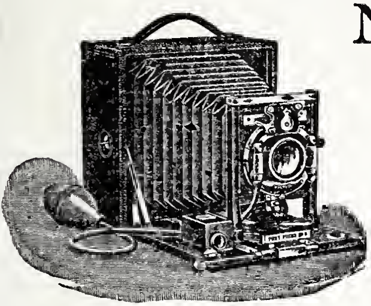

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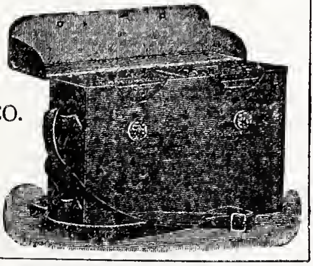

our stock of both books was exhausted as soon as received from England. A second shipment of a limited number of copies of each will arrive early in January, when all orders will be duly filled. The price of *Photograms* in paper covers, when mailed, is 75 cents *plus* postage 15 cents. Those who can get it by personal call at their dealer's will save this additional charge for postage.

◆

The first two numbers of a series of little books on *Useful Arts and Handicrafts*, published in America by The Photo-Beacon Co., Chicago, and in London by Dawbarn & Ward Ltd., come to our table as we go to press. No. 1 bears the title *Designing and Drawing for Beginners;* No. 2 is titled *Dyes, Stains, Inks, Lacquers, Varnishes, and Polishes*, how to prepare and apply them in decorative work. The series comprises over sixty monographs on home arts, written in simple language and fully illustrated. The numbers are to be published weekly, and, judging by the practical character of the two received, should win wide popularity among people interested in home hobbies.

We have arranged to act as Eastern agents for this series and will be pleased to send a detailed prospectus on request.

◆

*Modern Photography in Theory and Practice.* By Henry G. Abbott. 250 pp., illustrated. Paper covers, 75 cents.

*Progressive Lessons in Photography.* By Henry G. Abbott. 92 pp., illustrated, cloth boards, 35 cents. Published by Geo. K. Hazlitt & Co., Chicago.

Two first books for beginners in photography, the second being, apparently, a reprint of part of the first with alterations here and there. They contain much practical information in condensed form and are well worth their cost.

◆

*Amateur Photography.* By W. I. Lincoln Adams. 134 pp., illustrated. Published by the Baker & Taylor Co., New York. Price, 75 cents.

This is the fifth edition of Mr. Adams's popular handbook and has been revised and enlarged to cover the later developments of amateur photography.

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*Price-Lists and Catalogues,* Chas. H. Loeber, 12 East 17th Street, New York, sends to our table a neat 40-page price-list which is practically a cyclopædia of amateur photographic requisites. The illustrations have apparently been made expressly for the book, the arrangement of its information is admirable, and the prices decidedly interesting.

◆

W. P. Buchanan, Philadelphia, has just issued another edition of his amateur catalogue with the famous *Grover-cat* embossed upon royal purple covers. The catalogue is profusely illustrated and contains detailed descriptions of many photographic specialties often omitted from the general run of price-lists.

◆

Williams, Brown & Earle, Philadelphia, American agents for R. & J. Beck's well-known *Autograph* lenses, send us their latest list of these and other specialties controlled by them. Among the latter *Sun Flash Powder*, the *Perfection Flash Lamp*, and the new *Rembrandt Albums* will prove of interest to amateurs at this season of the year.

◆

A complete catalogue of the *Ideal* photographic specialties manufactured by Burke & James, 111 Wabash Ave., Chicago, has been published by this enterprising firm, and should have a place among the amateur's price-lists. Messrs. Burke & James are well abreast of the times and cater particularly to those who seek reliable material and apparatus at reasonable prices.

◆

The Lovell Dry Plate Mfg. Co., New Rochelle, N. Y., has prepared a second edition of 10,000 copies of its booklet on negative-making, titled *Sun Magic.* The formulæ have been carefully revised and simplified, and its plain information should make it useful to the beginner. While speaking of *Lovell Plates* we may mention that some days ago Mr. Hy. Wenzel, Jr., of Brooklyn sent us a capital photograph of the Dewey Arch made on a *Lovell Plate* manufactured more than three years ago. The negative was beautifully clear and brilliant, and afforded ample proof of the keeping qualities of this popular plate.

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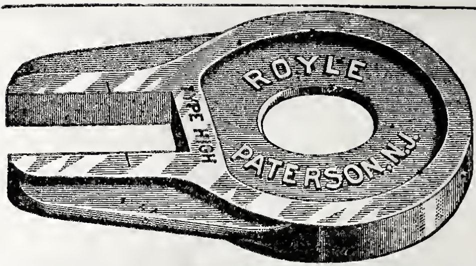

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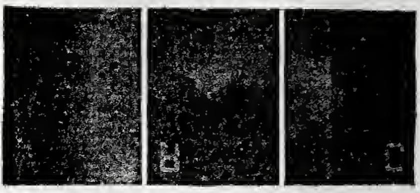

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THE PHOTO-MINIATURE

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Edited by John A. Tennant

Vol. I DECEMBER, 1899 No. 9

# LANTERN-SLIDES.

Except the portrait there is no photographic reproduction which appeals so strongly to the lay mind as does the lantern-slide. To such a mind the slide is known, not as a small, carefully prepared transparency on glass, but as a huge brilliant picture appearing on the white wall of a darkened room. There is still a wonderful glamour of mystery in the great disk of white light as the pictures succeed each other upon it, or melt gradually from one to the other, and the old name of "magic-lantern pictures," used by the uninitiated, was singularly appropriate. Only a short time ago the photographer felt inclined to scoff at what he termed a toy, and left the use of the lantern to the professional entertainer or the philanthropist, and the production of slides to commercial workers.

But within the past few years the amateur photographer has so increasingly taken up the work that he is to-day perhaps the largest user of lantern-plates. One great factor in influencing this change is undoubtedly to be found in the increase of amateur societies. A club meeting creates a wish for a picture which may be viewed simultaneously by a number of people; and by sharing the expense of a lantern, the club members meet a charge which would often be too heavy for an individual worker. The question of "art" is often raised in connection with lantern-slides, but as it is a subject as inexhaustible as empty, it may be left, so far as we are concerned, until that unfortunate and much prophesied date when the number of the subjects coming within the scope of THE PHOTO-MINIATURE shall have been exhausted.

The manipulation of lantern-plates does not materially differ in development from the manipulation of negatives or of bromide papers, and in some ways the work is easier. There being no necessity for any snapshot work in the making of a lantern-slide, the bugbear of under-exposure is avoided; and the wide latitude permissible, from normal exposure to over-exposure, overcomes the difficulty of over-printing. For it is a strange fact that the amateur is very prone to under-expose his negative, and over-expose his *Velox* or *Dekko* print.

**The Lantern-slide.** A lantern-slide is a positive transparency on a glass 3¼ × 4 inches square. The picture itself is smaller, and may be any shape preferred by the maker, and any size up to about 2¾ inches each way. The edges of the picture are defined by an opening of the desired size being cut in a piece of opaque paper. This paper is laid on the slide and masks out the edges and parts not wanted in the picture. Over the paper mask a piece of clear glass is laid of the same size as the one supporting the picture, and the two glasses are firmly bound together by glueing a strip of paper around their edges. This cover-glass serves the double purpose of holding the mask in position and protecting the film from injury. A slide is not in itself the end aimed at, but is rather—as is a negative—a means to the end.

The lantern-slide is to be viewed as a picture much enlarged, by passing through it a powerful beam of light which is thrown through a lens on to a screen or wall in a darkened room. The mechanical limitations in constructing a lantern for this purpose have necessitated a standard size for lantern-slides, and this size has been fixed at 3¼ × 4 inches. (In England the standard size is 3¼ × 3¼ inches, and British and American workers each maintain that their own size is the more practicable one. Fortunately, the slides of the two countries are interchangeable in all lanterns.)

It is very necessary that there shall not be any very dense or opaque parts in the film—the deepest shadows should have the appearance of stains rather than of deposits of matter, or they will appear on the screen as black masses. The highest lights should be clear glass, and between these two extremes there should be as much gradation as possible. A slide, therefore, should be full of detail and gradation, and clear in the shadows. The picture is magnified many times on the screen—from two or more feet in diameter in a small room, to over twenty feet in a very large hall. As there must be much loss of intensity of light in this enlargement, and as there is further loss in the reflection from the screen, we must guard against too much shadow in our slides. I do not mean from this that we must confine ourselves to light-colored or sunny subjects, but that our scale must commence with clear glass and we must obtain all the gradation possible in the higher scale of light. In a paper print it is often advisable to hunt for our detail among the deep shadows, even at the expense of the higher lights; but in a slide the deepest shadows must, if necessary, be sacrificed.

**Making.** Lantern-slides may be printed from a negative either by contact or by reduction. By contact is meant the process commonly used in making paper prints. The negative is laid in a printing frame, and against its film side is placed the film side of a lantern-plate. The back is placed in the frame, and a short exposure given to artificial light. In making a slide by reduction the negative is placed against a window or other source of light, either day or artificial, and is carefully focused with a camera. A lantern-plate is then placed in the plate-holder, and an exposure made on the negative. The contact method is used for making slides from small negatives, and by workers who do not care to provide the slight apparatus required for reduction. The reduction method is almost a necessity for anyone working with negatives of 4 x 5 size or larger. If we endeavor to print a picture 3 x 3 inches from a negative 4 x 5, the question of which part to leave out is often difficult, and with a larger negative the difficulty is greatly increased.

**Dust.** Just one word of warning before describing the processes in detail. Cleanliness and care are advisable in all photographic processes, but in the preparation of lantern-slides they are absolutely essential. Dust is our arch enemy; not only the dust which settles on a plate before exposure and so causes pinholes, but that fluff which has such an affinity for the wet surfaces of developed plates when reared up to dry. The finished result, being seen by transmitted light—instead of reflected as in the case of a paper print—and under much magnification, accentuates every flaw and scratch in the film, and any attempt to fake or patch a defect is consequently difficult. The remedy, therefore, is to take every care to keep the film clean.

**Dry-plate Processes.** The process almost universally used for making lantern-slides is the gelatine dry-plate process, under which term are included both gelatino bromide and gelatino chloride. The only other process worked to any extent is the wet collodion, which is still used by many who make slides in numbers for trade purposes. Among other processes are the dry collodion, the albumen, and the carbon; but, except perhaps the latter, their use is very limited and not likely to become more general.

**"Gelatino Bromide."** All the brands of dry plates on the market are what are commonly spoken of as gelatino bromide. The term is more general than technically accurate. The plate may be sensitized with bromide of silver, or the bromide may be replaced in greater or lesser degree with chloride of silver, or with a mixture of chloride and iodide. The plate sensitized with bromide is the more rapid one, and in proportion as the chloride is increased the plate becomes slower, until in the pure chloride we have one suitable only for contract work, and which may be developed in an ordinary room by lamplight, with no special precautions beyond a sheet of yellow paper to shield it from the direct rays. The chloride plate gives a wider range of tone than does the bromide—though the latter has sufficient latitude for most purposes. The character of the plate may be approximately judged from the appearance of the emulsion. In a bromide plate the emulsion is of a semi-opaque, creamy color, and a pure chloride plate is so colorless that it is difficult to distinguish the coated side by its appearance. This may be told by breathing on it, when the breath will condense on, and dull, the glass side only. Or if the finger be wetted it will stick to the corner of the coated surface, but not to the glass side.

**A Good Rule.** There is no *best* lantern-plate, though most slide makers have a favorite brand. There are minor differences, due to the various formulæ used in making the emulsions, but they do not affect the beginner. It is a good rule to begin with one brand of plate, and one developer, together with the wholesome belief that any failure is more probably due to the worker than to the materials. When one plate has been mastered, others may be taken up, and various effects of tone tried.

**The Negative.** A good technical negative is advisable, as the great increase in the size of the picture when shown on the screen magnifies every defect. Negatives which are under-exposed are useless, however much "faking" is attempted, and any negatives with very harsh contrasts should be avoided. The negative should be developed to obtain the greatest amount of gradation in the half tone—this obtaining of slight differences in detail being very essential. At the same time the negative should be such as will give a "plucky" print, in which there is not the slightest indistinctness, but every detail clear. If the negative has been correctly exposed and developed, the sky—in an outdoor subject—will probably be sufficiently dense; if not, it may be blocked out. If sufficiently expert, this may be done by painting on the film with Indian ink or some opaque color, but the following of a delicate skyline in this manner is one of those details, theoretically easy and often recommended, which in practice proves difficult. The best way, perhaps, is to coat the back of the plate with matt varnish in which a little aurantia or other yellow alcoholic dye has been dissolved, and scrape it away wherever it overlaps the horizon. Pour a little of Hance's varnish in a small cup and add a drop or two of the dye. Or a matt varnish may be made by dissolving 30 grains of sandarac and 30 grains of dammar in an ounce of ether. When dissolved decant the clear part and add to it 4 drams of benzole. A little less benzole will give a finer grain to the varnish; more benzole gives a coarser grain.

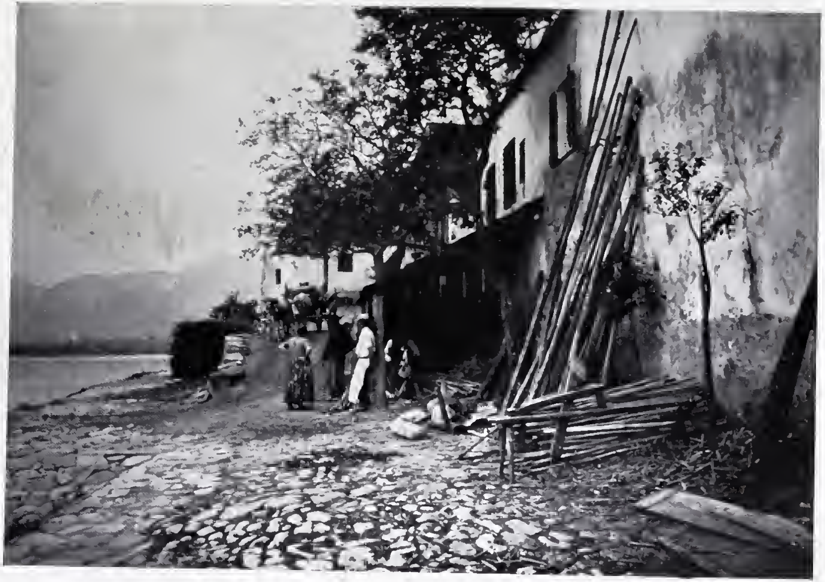
**Spotting.** Any pinholes or scratches in the negative should be carefully worked out, if they appear in the sky, or in any dense part of the negative. To spot a pinhole mix a little Indian ink with water, and use a very fine sable brush, well charged with water, and just tipped with the Indian ink. Hold the brush perpendicularly to the film and gently touch the centre of the hole, holding the point of the brush in contact with the film for a few moments to allow the color to soak into the transparent spot. Unless the worker understands retouching, it is not advisable to attempt any work beyond spotting. Unfortunately, however desirable a perfect negative may be, we often have to use a negative which is far from ideal. These defects may be largely overcome by a careful choice of the best lantern-plate, and suitable exposure. The old wet collodion process is unequalled for obtaining a passable result from a thin, ghostly negative. A slow, dry lantern-plate gives far better results with thin negatives than does a more rapid one. For the rapid gelatino-bromide plate a negative may be plucky *almost* to hardness if detail is not sacrificed. The more vigorous the negative the stronger should be the light by which the exposure is made. A very thin negative should be exposed to a very weak light, and the slightest trace of over-exposure should be avoided.

**Contact Printing.** Printing by contact is the method most commonly followed by the man whose time and means are limited, or who makes slides only occasionally. It has indeed but one serious defect in the limitation of the amount of negative which may be printed from. Its great advantages are that no special apparatus is necessary, and that it can be worked by artificial light in the evenings. Indeed, except the exposure, the whole of the operations until the plate is fixed are conducted in the dark room, and the exposure is merely a matter of seconds, using a gas-light. The negative from which the slide is to be made is gently but carefully dusted, and is laid in the printing frame. The box of lantern-plates is opened and one of them is placed in the frame, its film in contact with the negative film. If the back of the printing-frame is not lined with black cloth a piece should be placed over the back of the lantern-plate before the back is pressed in. If the negative is not smaller than 4 × 5 then the edges of the lantern-plate will not be protected from the light, and we shall get a certain amount of halation from reflected light which may reach in from the edges to the part we wish to include in our picture. A mask of paper, placed outside the frame, just sufficient to shield the edges, will prevent this. In printing from a larger negative a slight modification of the frame will be necessary. A frame larger than the negative will be required, say for a 5 × 7 negative use an 8 × 10 printing-frame. In this, place a piece of patent plate glass, or other glass if it is clear and sufficiently strong. On this glass lay a sheet of black or non-actinic paper with an opening 3 × 3 inches cut in its centre. The negative from which the print is to be made is next placed in the frame. The extra size of the frame allows any desired portion of the negative to be placed over the opening in the mask. The lantern-plate is then placed in position on the negative and the back fastened in. It will be seen that unless some special precaution is taken the whole pressure of the back will be upon the small area of the slide. To prevent this the lantern-plate is placed in a kit or carrier, the full size of the frame. This kit is a piece of wood of the thickness of the lantern-plate, with a hole cut in its centre 3¼ × 4 inches, to receive the plate. Or it may be of thicker wood, if necessary, with a bed sunk in it to receive the plate. This bed should be lined with black cloth. Frames specially intended for contact printing are obtainable commercially. In some of these the frame is of sufficient size to allow of moving of the negative, but the opening to admit the light is of lantern-plate size only. When the back is fastened in the frame it is ready for exposure.

**Contact Exposure.** The question of exposure is one which causes an undue amount of trouble, and it is responsible for very many failures. These failures are largely due to hap-hazard work. A parallel case which will be familiar to many who have never made lantern-slides is that of the developing papers, such as *Dekko* or *Velox*. With a careful judging of the negative, followed by an equally careful exposure to the light, the failures from this cause are few. But accuracy is very essential. Many workers will say that they expose their plate—or paper—"about a foot" from their light. But they hold the printing-frame in their hand, and guess the exact distance. If instead of a foot, they hold the frame within ten inches of the light, they obtain about double the exposure which they get by holding the frame fourteen inches away; and yet in each case the distance could be termed "about a foot." The question of the light, too, needs some consideration.

There is much variation in lights which are usually considered reliable. The incandescent electric lights used for lighting our houses vary perceptibly in brilliancy, not only on different evenings but often within a few minutes, and gas is dependent on a variable pressure in the "mains." Fortunately a considerable latitude is allowable in exposure, and with reasonable care the failures should be few. Gas and oil are as good artificial lights as any, and within the reach of all. In using gas choose a fair-sized burner, and turn the gas on sufficiently to obtain the biggest flame without flaring or "roaring." If an oil-lamp is used some mark should be placed on the chimney to show the height of the flame, and the wick should always be trimmed. If the light can be placed on a table, or if a shelf may be put immediately under it, distances from the light should be marked on the table or shelf, every six inches to three feet. In case a pendant light is used, tie a string to the bracket with a knot tied every six inches. In this way, whether the printing-frame stands on the table or is held in the hand, the exact distance from the light is known. There is a considerable difference in the rapidities of different lantern-plates, but a few experiments will determine the correct exposure. Place a lantern-plate, in contact with a negative, in a plate-holder. There will be no difficulty in doing this if a negative on thin glass is chosen, for the transparency emulsion is itself coated on very thin glass, and the two thicknesses will easily go into the holder. Hold the plate-holder two feet from your source of light—if gas or oil-lamp or light equally strong—if candle-light is used try a distance of one foot, and draw the slide out one-third of its length, and give 20 seconds exposure. Then withdraw the slide another third, and give 20 more seconds exposure. Finally withdraw the slide completely, and give a third 20 seconds exposure. There are now on the one plate three trial exposures of 20, 40, and 60 seconds. Develop the plate and the result will give the approximate exposure. If 40 seconds shows slight over-exposure, we may fix the correct exposure at 30 seconds or try a second plate, giving on it exposures of 26, 30, and 34 seconds.

When once a standard or unit is found, grade all negatives into four or five classes according to their densities, and try an experimental exposure from each batch. It is a good rule to work at a standard distance from the light—two feet is a good distance—but there are exceptions. In the case of a very dense negative the exposure should be closer to the light, and with a very thin negative the distance should be increased. The nearer the source of light the greater appears to be its "momentum" in striking and penetrating dense high lights. If further removed it appears to have a softer effect, very beneficial for thin negatives.



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HEDWIG
Ph. R. von Schoeller

**Intensity of Illumination.** There is an oft-quoted law on this subject which must be given here. "The intensity of illumination varies inversely as the square of the distance from the source of light." Suppose that at a distance of one foot from the light an exposure of four seconds is required. At a distance of two feet the light would not be half as strong, but only one quarter as strong; for at two feet away the light has spread both vertically and horizontally, and so covers four times the area. At a distance of three feet away the light has spread to three times the height and three times the breadth, and therefore covers nine times the area it did at one foot.

Therefore if we move our negative two feet from the light we shall require 16 seconds exposure, and if the distance is increased to three feet, we shall require 36 seconds exposure.

The development of a lantern-slide is the same whether it is printed by contact or reduction, and will be described after we have dealt with reduction in the camera.

**Reduction Method.** If we wish to make a slide showing the whole of any negative which is larger than 3 × 3 inches we must work by reduction. The negative to be reduced is placed in position, and is carefully focused with a camera; a lantern-plate is placed in the plate-holder and a photograph of the negative is taken. A room darkened as described in THE PHOTO-MINIATURE No. 8, for bromide enlarging, will serve the purpose perfectly. To repeat very briefly: The window of a room lighted from the north is completely darkened by closely fitting into it a dense black cloth, or double thickness of brown paper, mounted on a light wooden frame. An opening of the size of the negative is cut in this screen and the negative placed in it. It is thus illuminated by the light which comes through it, and a camera placed in position inside the room is focused on it and the exposure made.

**Reduction on a Fixed Scale.** If all our negatives are of one size, and we reduce them to the same scale, the work is much simplified. A "fixed-focus" reducing camera is simply a long box, in one end of which the negative to be reduced is placed. The other end is fitted with a groove to hold a plate-holder containing the sensitive plate. The camera is divided into two parts by a division parallel to the negative and plate as shown in Fig. 1, and in this division a meniscus lens is placed. The image is always in sharp focus, and the only things to be considered in making the exposure are the density of the negative and the intensity of the light. As these cameras are without intricate movable parts, and as there is no necessity for a rapid and high-grade lens, their price is very reasonable. Among those on the market the *Ideal* and the *Griffiths* may be mentioned. When the negative and plate are in position the whole box may be tilted with the negative toward the light and the exposure made.

**Reduction by Focusing.**

The fixed-focus camera is a great help to those whose negatives are always taken on 4 × 5 plates, but where larger negatives, or negatives of various sizes may be used, a modified form of camera is required. Our requirements now are: some arrangement for holding the negative and the sensitive plate parallel to each other, a means of focusing, and some universal motion by which any portion of the negative may be brought opposite the axis of the lens. There are many cameras specially built for this purpose, and in almost every case they are thoroughly satisfactory in their work. Such a camera is practically two cameras, one only of which is fitted with a lens. In the larger camera the negative is placed, and through the front of this camera the lens of the smaller one is inserted and the negative focused. Fig. 2 shows a home-made apparatus. A is a camera, which may be the one in which the negative was taken, with its lens removed, and B is a small camera, resting upon a table C, temporarily but firmly fixed to A by means of buttons, or by sliding in a groove. The negative is placed in a plate-holder in A. The central sheet which separates the two plates in a holder must be removed and a kit substituted, so that light may be transmitted through the negative. Focusing is done by the rack and pinion of the small camera, and the amount of reduction is regulated by the rack of the large camera. The rising and falling front of the large camera, carrying the small camera with it will, in most cases, place the copying lens centrally opposite the part required to be reduced; in very extreme cases the holder carrying the negative may be slightly withdrawn to obtain the centre, and the strip of light which is thus let into the big camera can be blocked out by covering it with a cloth. If the large

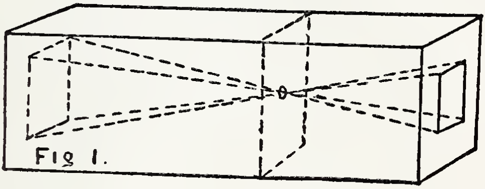

Fig 1.

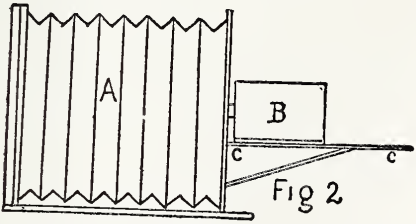

Fig 2

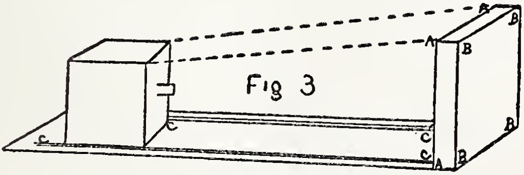

Fig 3

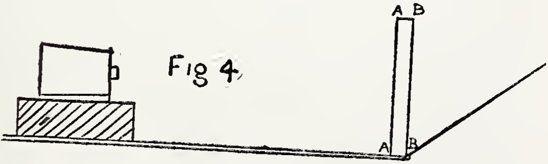

Fig 4

camera is placed on a stand or a tripod, and if possible one with a tilting or a universal head, the whole may be placed near the window and tilted to the sky for exposure.

**Home-made Apparatus.** Fig. 3 shows an apparatus which may be constructed in a few hours by those who have not the two cameras requisite for the method last described. The description here given is for solid and thoroughly satisfactory "hedge carpentry," and may be elaborated if wished. Procure a planed, seasoned board, about four feet long, twelve inches broad, and one inch thick. At one end of it raise a frame, at right angles to the length of the board, and perpendicular to it. This frame should be made to hold the largest negative from which a slide may be required, and if different sizes of negatives may be used, a nest of "carriers" or kits should be fitted into it. This frame is shown by AA. BB. in Fig. 3. The kits fit on A.A.A., and in B.B.B.B. a sheet of fine ground glass or tissue-paper is placed to diffuse the light. Two strips of one-inch wood (CCCC) should be fastened along the board with just sufficient space between them to allow the base board of the camera to slide to or from the negative. Or a slot may be cut along the length of the board through which a long screw is passed to clamp the camera in any desired position. If the camera is so low that its lens is not on the same level as the centre of the negative to be copied, it may be raised on a box or stand built to slide in the groove as is shown in Fig. 4. The negative is placed in the frame, and the camera is slid along the board until the correct size of image is obtained, and accurate focusing is then done. We have already spoken of the need of sharp definition. Focusing should be done by means of a small magnifying glass. When the negative is focused, and the slide ready for exposure, lay a couple of thin sticks of wood—as indicated by slight dotted lines in the diagram—from the negative frame to the camera, and over this throw a focusing or other dark cloth, to shut out light except that coming through the negative. This gives us, in crude but serviceable form, the two cameras of the more expensive apparatus. It is possible to obtain a photograph of the negative without this precaution of the focusing cloth, but the exclusion of extraneous light is always advisable, and often essential, for we wish our

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NEAR GAMMELSKAGEN
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transparency to be of the greatest possible clearness. If the stand is rigidly made, and the camera firmly clamped in position, the whole may be tilted toward the light, if daylight is used, and the exposure made.

**The Light.** A north light is the best for most photographic work, because it is the most steady in intensity, and protected from the direct rays of the sun. The negative should face direct to the clear sky without any tree or building or column of smoke intervening. If a clear sky cannot be used the negative must face a white reflector placed at an angle of about 50° from it (as shown in Fig. 4). In reflecting daylight, the reflector should be placed where it obtains the greatest intensity of illumination, not necessarily absolutely close to the negative. In pointing a camera toward the window, the reflector should be outside the window and so reflect the light direct from above. The reflector should not have a glossy surface, and on no account should a mirror be used. A sheet of white blotting paper will give the best even light.

**Reducing by Artificial Light.** Daylight should be used for reducing, whenever it is practicable, as the work can be done more quickly, and an even illumination of the negative is more easily secured. The only difficulty connected with artificial light is in getting a steady and equal light through the whole of the negative. In the case of a 4 × 5 negative this is easy, but as a larger negative is used the difficulty increases. The negative is placed in the frame, and focused as for daylight enlarging. A little extra care will be needed here to get the image absolutely sharp. Place a lamp or candle behind the negative, and with the largest stop focus sharply with the help of a magnifying glass. If a number of reductions are to be made to the same scale from negatives of one size, there is no need to focus for each one. When once the correct focus is obtained, clamp the camera firmly to its bed, and it will be ready for each negative. A sheet of ground glass is placed behind the negative, to diffuse the light, and behind this the light is burned. If the worker possesses a lantern for showing his slides, he may use the light of this to illuminate his negative. The lantern should be so far from the negative that the disk of light just covers it. In every case where artificial light is used a sheet of ground glass or fine tissue-paper should be placed between the negative and the light. If a lantern cannot be had, a condenser for passing an even flow of light through the diffuser may be used in conjunction with a strong light such as gas or oil. The illumination of a negative by a single light, even when placed behind a diffuser, is too uneven to give satisfactory results. Unless a condenser can be used, we must obtain a larger area of flame or a more widely spread illumination by means of magnesium ribbon. A workable light for a negative of 5 × 7, or a little larger, is obtained by arranging five or six gas burners in a double tier in such a position that the six flames just meet at their edges, and so form an approximately even blaze of light of the area of six single lights.

**Magnesium.** Magnesium ribbon is the most suitable artificial light, if no condenser is used. The only objection to its use is that it gives off a very heavy smoke, which, however, is more inconvenient than injurious. Magnesium ribbon burns with a light so actinic that much less of it is required than would be expected. According to Paget instructions, exposure to one inch of magnesium ribbon burned at a distance of twelve inches from a negative in a contact frame, is equal to four minutes exposure to a "five foot" gas jet at the same distance. This relative intensity of course holds good in reduction work. To make an exposure by magnesium ribbon, burn the ribbon close behind the ground-glass diffuser, and keep it moving during burning so that the whole of the negative may be evenly illuminated. Or an even illumination is more certainly secured by placing a sheet of white blotting paper at an angle of about 45° from, and behind, the ground glass, and burning a piece of magnesium ribbon at each side of this reflector—so that the greatest possible amount of light may be reflected onto the glass, but the *direct* light from the burning ribbon must not in this case fall on the glass or negative.

**The Lens.** It is advisable, though not essential, to use a short-focus lens. If a lens of moderately long focus is used, the camera will require to be further from the negative and a considerable bellows extension will be needed, thus getting rid of compactness in working. Except where architectural views are to be reproduced, a single lens is all that is needed. A lens of 4 inches focal length will be found as convenient as any, and if it will cover a plate 3 × 3 inches with a fairly large stop—say *f*/12—it will do all the work required.

**Relative Exposures.** The exposure required for reduction work is difficult to state very accurately. As a rough guide I would place as equal the exposure by contact at one foot from a five-foot gas burner, and the reduction of a 5 x 7 negative lighted directly from a clear north light in December, using *f*/22 stop. That is to say, if fifteen seconds exposure were sufficient for the contact print, fifteen seconds would suffice for the reduction. But this is only approximate. The exposure should be reduced as much as possible by using a large stop; if *f*/12 will cover the plate, do not work with a smaller stop. If magnesium ribbon is burned behind a 5 x 7 negative, using a rapid lantern-plate, such as Cramer or Eastman or Carbutt, use *f*/12, and make a trial exposure by burning six inches of ribbon.

**Bromide and Chloride.** The developing formulæ given here are, unless specifically stated otherwise, "all-round" standards, suitable for any commercial gelatine plate. There are slight differences in the working of bromide and chloride plates. The former give the more uniform results, with average care; the latter are more amenable to special after-tonings and local control. The bromide plate is the more widely used, and the chloride plate is favored by the worker who strives after special effects, and devotes individual care to each slide.

**Development.** Development in lantern-slide making is essentially the same as in negative making. As the lantern-plate is many times slower than any negative plate commonly used, we may considerably increase the amount of light in our dark room. Ruby light should be dispensed with altogether; a couple of thicknesses of yellow paper being sufficient protection, with an extra thickness, if necessary, when daylight is used to illuminate the dark room. In fact, if the daylight is of a safe actinic color, it may be of volume sufficient to allow of reading a newspaper by it. This increase of light enables us to watch the development of our plate closely, and to remove it from the developer at the moment it reaches its best. The dish should be of porcelain, to allow development to be more closely watched; some workers prefer a glass dish, in which they can hold the plate over the light and judge it by transmitted light. At first, until experience is gained, each plate should be developed separately; later, if quantities of slides are required, four or more may be developed side by side in one dish.

There are as many development formulæ for lantern-plates as for negatives. I give three formulæ from which the beginner may with advantage make his choice. First, I would give the plate-makers' own formula. The formulæ printed by makers and issued with their plates are always the result of very careful experiment, guided by a full knowledge of the exact ingredients of the film, and therefore may be relied on to give good average results. The second formula is the "hydroquinone formula," which has been a standard for many years. It is a two-solution developer and is made as follows: No. 1, hydroquinone, 80 grains; sodium sulphite, 1 ounce; citric acid, 30 grains; potassium bromide, 30 grains; water, 10 ounces. Dissolve the sodium sulphite and the citric acid in 6 ounces of water, and then add the other ingredients and the rest of the water. No. 2, sodium hydrate, 80 grains; water, 10 ounces. For use with a plate which has received a normal exposure take ¼ ounce No. 1, ¼ ounce No. 2, and ½ ounce of water. This amount is sufficient to cover a lantern-plate, if developed in a ¾ x 4 dish; if a larger dish is used, more developer should be used, as it is essential that the solution evenly cover the whole plate at the first immersion. This is made easier by first soaking the plate for a few seconds in clear water. This formula leaves nothing to be desired in its working, but it has the objection that it contains sodium hydrate. Many workers not unnaturally object to developers containing this caustic alkali, and for them the third formula, which is the "standard formula" of the New York Camera Club, is given. A stock solution is made of carbonate of soda, 200 grains; sulphite of soda, 200 grains; hydroquinone, 50 grains; water, 10 ounces. For cold black tone, give a normal exposure, take equal parts of stock solution and of water, adding one or two drops of a ten per cent. solution of bromide of potassium. For warmer tones increase the exposure, and use a more diluted developer, at the same time increasing the bromide solution to 15 or 20 drops. When I speak here of a "normal" exposure, I mean one which would be considered correct in negative making, that is, using a standard developer, the picture would begin to appear in about a minute or a little less, and a negative, clear and full of detail, with sufficient density, would be obtained in four or five minutes. To develop the plate place it in the dish and pour the developer evenly over it. The picture should begin to appear in a minute and should appear fully developed in three or four minutes. Examine the plate by transmitted light and then continue development even if the plate appears sufficiently dense. The density will considerably reduce in fixing, and the usual mistake of the amateur is to under-develop.

**Other Developers.**

The two developers given are based on hydroquinone, but years before this useful agent was known the favorite developers for lantern-slides were pyrogallol (pyro) and ferrous oxalate. Perhaps the most convenient of the pyro developers—and equal to any—is made by adding dry pyro to a stock solution made of carbonate of soda, 1 ounce; bromide of ammonium, 12 grains; water, 8 ounces. For use take 1 ounce of this solution and add to it half a grain of dry pyro, or, as an old worker would vaguely put it, "some pyro on the end of the blade of your pocket-knife." With this formula and a correct exposure, a rich brown tone is obtained. But over-exposure will yield an unsatisfactory tone, and under-exposure will lead to stain through forced development.

Carbutt's ferrous oxalate developer, though intended in the first place for his own plates, is one of the best all round developers. It is a two-solution developer—No. 1, oxalate of potash, 8 ounces; citric acid, 30 grains; ammonium citrate solution, 1 ounce; water, 15 ounces. No. 2, sulphate of iron, 1 ounce; sulphuric acid, 5 drops; water, 16 ounces; for development take 1 ounce No. 1, ½ ounce No. 2, and add a few drops of a 10 per cent. solution of bromide of potassium. The ammonium citrate solution is made by dissolving ¼ ounce of citric acid in 1½ ounces of water; and a few drops of strongest water ammonia to neutralize the acid, then add water to make up to two ounces. The sulphate of iron used should be in clean crystals of a bright green color. If the crystals are covered with a dull, rusty dust (due to oxidization by air) they should be rejected.

Ferrous oxalate developers normally give black tones; by increasing the exposure and adding more bromide of potassium to the developer warmer tones are obtained.

**Ortol-metol.** The ortol-metol formula, recommended by Henry Wenzel, is a good one-solution developer for slides: Water, 10 ounces; metol, 12 grains; meta-bisulphite of potassium, 6 grains; ortol, 18 grains; sulphite of sodium (crystals), ½ ounce; carbonate of potassium, 80 grains; bromide of potassium, 5 to 10 grains; hyposulphite of soda, 1 grain. If warmer tones are required increase the amount of potassium bromide. This is a formula specially recommended for Lovell lantern-plates, and I have found it work well, both with the Lovell and with other brands.

**Fixing.** When it appears as if the plate is beginning to veil all over, remove it from the developer and wash gently under the tap for two minutes and then immerse in a strong hypo solution—six or seven ounces in a pint of water. The slide will appear to fix more rapidly than does a negative, and will clear in three or four minutes, but it should be left in the hypo fully ten minutes. After fixing, wash the plate very thoroughly in running water. The fixing and washing must be sufficient, especially if the plate is to be subjected to after-treatment.

**Clearing Solution.** A saturated solution of alum and citric acid (equal parts) in water should be used for clearing. A saturated solution is guaranteed if some of the alum and acid remain undissolved at the bottom of the bottle after repeated shaking or stirring. Take 2 ounces of the clear liquid and add ½ a dram of hydrochloric acid. If this is poured over the plate in a dish, the dish should be steadily rocked to keep the solution continually flowing over the plate. The best way of applying it is to hold the plate in a special holder and flood the clearing solution over it and back into the bottle many times. Some workers never, or seldom, use a clearing solution. I am much in favor of it and recommend its use even when the plate appears perfect. Sometimes a scum forms on an oxalate developed plate. If so, use a clearing bath of oxalate of iron, 1 part; alum, 4 parts; water, 50 parts. Wash thoroughly after using this bath.

**Restrainers.** In these formulæ, bromide of potassium and bromide of ammonium are both referred to as restrainers. A word may be useful in explaining these. Bromine is an orange-colored liquid obtained from seaweed, or commercially from the salt springs of Stassfurt, or in a lesser degree as a by-product in the manufacture of certain chemicals. It is an element—that is, it cannot be divided into two or more constituent parts. Bromine is united with ammonia to form bromide of ammonium, or with potassium to form bromide of potassium. It is a moot point which of these is the more efficient restrainer. The bromide added as a restrainer appears to form a compound with the unaltered silver bromide in the film, and to make it less sensitive to the action of the developer.

**Toning Slides.** The tone of a lantern-slide, whether gelatino bromide or gelatino chloride, may be decided either by the length of exposure and the development, or by an after-process. The former of these methods is doubtless the one giving the more permanent slide. The broad rule of development toning is that a prolonged exposure and a heavily restrained developer give warm tones. The restrainer usually used is a 10 per cent. solution of potassium bromide. Another formula is ammonium bromide, ½ ounce; ammonium carbonate, ½ ounce; water, 10 ounces. The addition of ammonium carbonate is objected to by some workers as likely to render the tone fugitive, but we have not found it so. The carbonate of ammonium should be in clear lumps. On exposure to the air it becomes coated with white powder (bicarbonate), which should be scraped off. The table issued by Cullen for use with the Paget plates is a good, all-round guide. The developer he recommends is one of the many modifications of the hydroquinone developer and may be given here. No. 1, hydroquinone, ½ ounce; sulphurous acid, ¼ ounce; potassium bromide, 60 grains; water to make 20 ounces. No. 2, sodium sulphite, 2½ ounces; caustic soda, ½ ounce; water to make 20 ounces. It will be noticed that it is one of the many formulæ containing caustic soda, and this may be avoided by substituting 2 ounces of carbonate of soda instead of the ½ ounce of caustic soda.

The No. 3 solution he uses, and referred to in the following table, is the ammonium bromide and ammonium carbonate solution just given. A plate with a normal exposure is developed with ¼ ounce No. 1, ¼ ounce No. 2, ½ ounce water (none of No. 3). Development in this case is complete in three or four minutes. To get warmer tones, ranging through brown to red, the exposure of the plate is increased, and an increasing quantity of No. 3 is added to the developer. The No. 3 solution serves two purposes; the addition of bromide of ammonium, which is contained in it, restrains the plate from developing too quickly, and the carbonate of ammonium, which also appears to act as a restrainer, assists in producing a much warmer deposit than can be secured by means of the use of the bromide alone. The longer the exposure which is given to the plate, the more of the No. 3 solution *must be used*, and the warmer the resulting slide will be. By following this simple method, a range of tones from black through warm black, brown, purple brown, and purple to red may be secured.

It should be noted that the proportion of the No. 3 solution used determines the *time of development*, as well as the color of the image. The table on page 447 gives approximate relative exposures, proportion of No. 3 solution required, and time of development.

It will be seen that the exposure ranges from 30 seconds to 5 minutes, and development from 3 to 15 minutes. The proportion of No. 3 is also increased (and the amount of water proportionately decreased) until, to secure the red tone, we have more than one-half an ounce of No. 3 (480 minims = 1 fluid ounce) and only 180 minims of water.

**Toning by Intensification.** A plate to be intensified should be fixed in a newly mixed plain hypo bath, neutralized with a few drops of liquid ammonia, and then washed in running water very thoroughly. The intensifier is made of bichloride of mercury (poison), 4 drams; chloride of ammonium, 2 drams; water, 6 ounces. Place the slide in a clean porcelain dish and flow this intensifier over it. Rock the dish occasionally until the slide is bleached thoroughly, and then wash the slide well in running water. When the slide is thoroughly washed it may be toned by one of several methods. One which has proved very satisfactory in my hands, and appears especially useful with bromide plates, is suggested by John A. Hodges. It gives a tone varying from sepia to reddish-brown, the latter color resulting on a very thin image. It is not suitable for use with a plate developed by ferrous oxalate. No. 1. Uranium nitrate, 30 grains; acetic acid, 3 drams; water, 10 ounces. No. 2. Ferricyanide of potassium, 30 grains; acetic acid, 3 drams; water, 10 ounces. Use equal quantities of each, mixed just before using, as the mixed solution does not keep. The plate is immersed in this and the dish slightly rocked until the toning action has been carried to a sufficient depth, afterward washing for ten minutes. This period should not be exceeded, or the slide will become lighter in tone.

### TABLE OF EXPOSURES AND DEVELOPERS.

| Time of Exposure. | Constitution of Developer. | Time of Development. | Color of Deposit. |
|---|---|---|---|
| 30 secs. | No. 1 ... ½ ounce<br>No. 2 ... ½ "<br>Water to make 2 ounces | 2½ to 3 min. | Black |
| 60 secs. | No. 1 ... ½ ounce<br>No. 2 ... ½ "<br>No. 3 ... 100 minims<br>Water to make 2 ounces | 5 minutes | Brown |
| 90 secs. | No. 1 ... ½ ounce<br>No. 2 ... ½ "<br>No. 3 ... 200 minims<br>Water to make 2 ounces | 10 minutes | Purple Brown |
| 180 secs. | No. 1 ... ½ ounce<br>No. 2 ... ½ "<br>No. 3 ... 250 minims<br>Water to make 2 ounces | 12 minutes | Purple |
| 300 secs. | No. 1 ... ½ ounce<br>No. 2 ... ½ "<br>No. 3 ... 300 minims<br>Water to make 2 ounces | 15 minutes | Red |

**Red Tone.** The simplest color obtainable after intensification is undoubtedly red, which is obtained by placing the bleached and *washed* slide in a freshly mixed hypo bath. With different plates and developers the tone thus obtained will vary from a brown tinge to almost a yellow, according to the plate used. A browner tone will be obtained by placing the plate in a solution of ½ ounce carbonate of soda, 4 ounces of water.

**Gold Toning.** A plate which has been bleached with mercury may be toned, after washing, in a solution of 1 grain of chloride of gold in 1 ounce of water; a wide range of tone from pink to greenish blue may be obtained, according to the length of time the plate is left in the solution.

**Stieglitz Method.** The artistic possibilities of a lantern-slide were never fully grasped until Alfred Stieglitz showed his locally reduced and locally toned slides, and his slides in which what he terms compensating cover-glasses are used. His method is to much over-develop the plate and obtain his values by local reduction with the Farmer reducer. In a succeeding paragraph we give a simple resumé of this mode of reducing, and here we insert Stieglitz's own formulæ for three tones which are very often desired. For this special work a plate such as the Seed or the Paget is used. Wonderful effects can be obtained by a capable worker on a Seed G. B. P. R. plate.

**Blue Tone.** In many cases it is desirable to color a slide to a pure blue, or perhaps only a suspicion of blue. An absolutely reliable method to obtain this color is to use the following bath: No. 1. Sulphocyanide of ammonium, 200 grains; water, 32 ounces; carbonate of soda (granular), 2 grains. No. 2. Chloride of gold (brown), 15 grains; water, 1 ounce. For use take two ounces of No. 1 and 4 drops of No. 2, always remembering to add No. 2 to No. 1 and never reversing the operation. This amount of solution will tone at least one slide to a perfect blue. The toning bath, in order to work satisfactorily, ought to have a temperature of 72° to 76° Fahr. Using the bath at a lower temperature results in failure, as the toning proceeds too slowly, and unsatisfactorily in other respects. A higher temperature will hasten toning, but the gelatine of the plate is apt to be attacked in a most disagreeable way.

To judge the process of toning, it is necessary to examine the slide by transmitted light, using daylight, if possible. A thoroughly toned slide will have a pure blue color when examined in this way. It is advisable to tone reduced slides after they have been dried, especially in such cases in which only partial toning is to be used. As for the density of toned slides, let me say that those toned with the above bath do not increase in density perceptibly.

**Green Tone.** In order to obtain a green slide, the following treatment is best: No. 1. Oxalate of iron, 20 grains; ferricyanide of potassium, 15 grains; water, 32 ounces. No. 2. Chromate of potassium, 5 grains; water, 16 ounces. Bathe your slide, which in this case must be somewhat lighter than the desired result, in No. 1. In this bath the color will turn to a dark blue. From this it is placed in No. 2 for a minute, and then dried. When dry the slide will be a bright green.

**Bartolozzi Red.** Bartolozzi red is obtained by using the following bath: No. 1. Ferrocyanide of potassium (yellow prussiate), 15 grains; water, 16 ounces. No. 2. Nitrate of uranium, 30 grains; sulphocyanide of ammonium, 150 grains; citric acid (crystals), 30 grains; water, 16 ounces.

For use, take equal parts of No. 1 and No. 2, and place your slide, which must be first thoroughly soaked, in this solution. It will quickly assume a beautiful Bartolozzi red color. In many cases the whites are stained in coloring the slides in this way, and in order to remove the same dip them into carbonate of soda, 15 grains; water, 32 ounces; for a moment, not longer, and the stain will disappear. After this operation proceed to wash.

**Local Reduction.** The lantern-slide may be locally controlled, so far as the density of any portion of the slide is concerned, as easily as in making prints upon paper. Thus we may entirely clear an undesirable sky until we get clear glass, or reduce over-dense shadows or foliage, or harmonize the different planes of the picture, as when the foreground is dark from under-exposure. This is done by local reduction, and the ferricyanide and hypo method is perhaps the simplest and most efficient for the purpose.

There has been a great deal written and said about this method and its limitations, says R. R. Rawkins in *Photography*, but very little practical advice has been given, and I therefore propose to deal with the subject in as simple a manner as possible, describing my own method of working.

**The Reducer.** A solution of ferricyanide of potassium and hypo-sulphite of soda as a reducer attacks the high lights and half-tones more readily than the shadows—a fact which is of considerable advantage in slide making. Ammonium persulphate reduces the dense portions uniformly, but at the same time discharges the color of warm-toned slide. Ferricyanide does not affect the colour of a slide that has been developed to a warm tone, which is another advantage, seeing that a good warm tone is undoubtedly more pleasing for most subjects than the commercial black. A ten per cent. solution of ferricyanide should be made up, and will keep indefinitely. Two brushes, some blotting paper, and a tuft of cotton wool are also required. Camel-hair brushes may be used, but I prefer a home-made one consisting of cotton wool wound round a piece of thin, tapering wood, leaving a small wad at the point, taking care that the wood does not protrude and scratch the film.

**Manipulation.** Pour an ounce of the ferricyanide into a cup or measure glass, and insert a loose piece of cotton wool. Take the plate from the hypo, and, without washing, mop over the whole slide with the ferricyanide until the details are visible in the half-tones, wash quickly, and blot off the superfluous moisture. Now, if the slide is of a landscape with which you want to combine a cloud by printing on another plate, using it as a cover-glass, the whole sky portion must be reduced to clear glass. To do this, dip one of the brushes in the hypo, and carefully trace round the horizon and any trees or buildings that may project into the sky portion; then go over the whole ground again with the other brush charged with ferricyanide, and the fog and veil caused by the over-exposure and prolonged development will gradually disappear. Continue the painting, using the solutions alternately, washing under the tap after every few applications, until the sky is all but clear; wash quickly, and blot off the water. In cases where the skyline is very intricate, the over-hanging foliage or trees may be painted over together with the sky as, owing to the peculiar action of the reducer, the sky will be almost cleared before any appreciable reduction of the strong image has taken place. Should there be any very delicate half-tone encroaching on the sky portion, great caution must be exercised, or the detail will be destroyed.

The sky having been cleared, and the plate rinsed, local reduction of the landscape portion may be proceeded with, and having formed some idea as to what the final result should be, the parts that require reducing slightly or wholly can be painted over first with the hypo and then with the ferricyanide. This is best done by holding the plate film downwards over a white dish, and the painting done from underneath. By this means the course of the brush can be easily followed, and any superfluous solution will run down the handle of the brush into the dish. The brushes I now use are made with this idea in mind, being as described, but cut down and tied with strong cotton at right angles to another strip of wood, which answers as a holder, and prevents the solution from running down on one's fingers. The brush looks somewhat like a diminutive golf club. After reducing any portion of the image, the plate should be well rinsed under the tap before applying the solutions to other portions. It is necessary to exercise great care when approaching the high lights, or these will reduce to clear glass and give the slide an unpleasant chalkiness. It is in this altering of tone values that the worker's own personal feeling comes into play.

In one instance I found it necessary to reduce a portion of a slide from a full tone to a very delicate half-tone, and as this portion was almost in the centre of the plate with an abundance of soft detail on either side, the following method was devised: A piece of plain paper was placed in contact with the slide, and the outline of the portion traced with a pencil on the paper. The paper was then lifted from the slide, and the marked portion cut away with a sharp knife. The other part was used as a mask, which, after soaking in a two per cent. solution of sodium sulphite, and placing in contact with the film, effectively prevented any superfluous solution from gaining access to the other portions of the slide; although several drops did fall on the mask, the sulphite and the thickness of the paper stopped the action of the reducer.

If the ferricyanide is used stronger than ten per cent., its action is too rapid, and, in addition, causes a yellow staining of the gelatine. If, after the manipulations of the slide, there remain any yellow discoloration, it can be removed by immersing the plate in a two per cent. solution of sodium sulphite.

**The Wet Collodion Process.** For thirty years wet collodion was the standard process of all photography, but so rapidly and completely has the dry plate superseded it, on account of its greater convenience, that the older process is quite unknown to the majority of present-day workers. To teach the manipulation of wet collodion would tax the limits of a number of THE PHOTO-MINIATURE, and in this description of the process I will merely give sufficient detail to enable the worker to decide whether it is worth attempting, and at the same time will endeavor to give the collodion worker a few hints especially applicable to this branch of his work.

**The "Wet."** The process is known as "wet" because the glass is coated with an emulsion, and before the emulsion is dry the exposure is made, and the picture developed and fixed. This means that the worker must be his own platemaker. Collodion is the substance used to hold the sensitive silver, instead of gelatine, as used in the "dry" plate film.

**Advantages.** The advantage of wet collodion does not lie, as often stated, in the superior excellence of the results obtained with it. I doubt if it equals some of the newer processes in this respect. It does yield very clear high lights and very good shadows, but the range of half-tone, or gradation between the two extremes, is not as great as in the gelatino-bromide, or even the gelatino-chloride plate; and it is not easy to obtain a wide range of tone. The process is, however, unequalled for commercial work. By it a fair quality of slide may be steadily made, with little risk of failure, and the slides may be made from negatives of very moderate quality, which could scarcely be made to yield satisfactory results by any other process. To the man who understands the process it is very simple in its working, and it is very cheap.

**The Stages.** Half the stages of the work will be unknown to the dry-plate worker, but once mastered the manipulation is (with *care*) simplicity itself. First, the glass must be cleaned, and this is a vital and integral part of the work. Then it must be coated with the collodion film and sensitized with nitrate of silver. Then come the operations of exposing, developing, and fixing — all more or less familiar — and finally the plate must be varnished to protect the film.

**Care.** Collodion is much more tender in texture than gelatine, and must be handled carefully. From the first coating of the glass to the final washing we are dealing with a wet or tacky film, ready to seize on any dust or slight impurity in the air.

**The Glass.** The cleaning of glass is dealt with on another page; but the final polishing with tripoli must be omitted. But polish it well with a *clean* chamois leather washed in water only. Around the edges of the plate—on the side to be coated—a line should be ruled with a fine brush, dipped in a solution of pure rubber, dissolved in benzole to the consistency of thin syrup. This edging of waterproof tends to prevent the water used during subsequent washing from getting between the film and the glass, and so washing the film away.

**Collodion.** Collodion—which is one of the most inflammable of substances, but quite safe if used with reasonable care — should be purchased ready for use. Do not dabble with its preparation. An iodized negative collodion should be used. Iodized collodion matures or ripens with age. When freshly made it is a pale yellow color, and it gradually darkens, through red, to a rich deep ruby. Collodion three or four weeks old should be used, and if a little — say ten per cent. — of an older ruby-colored collodion should be added to it, it will be still better.

**Coating the Plate.** The glass to be coated should be held by means of a suction cup attached to its reverse side, or it may be held by two edges between the thumb and finger. Dust the glass very gently, and pour a little collodion onto it. Tilt the glass until the collodion has flowed to every corner and covered the whole area. Then let it drain from the corner last covered into a bottle—not the one from which the collodion was first poured. Do not rest the corner of the glass on the mouth of the bottle, or vibration marks may show in the film. As soon as the film is "set" so that a finger-mark shows when the corner of the plate is touched, the plate is ready for sensitizing.

The film may reach this stage in less than a minute from the coating of the glass—and it must then be sensitized before any part of it becomes dry. During this setting the plate should be steadily rocked to insure even coating, but the corner from which the collodion drips should be kept downward, and should retain that position through the subsequent operations.

**The Nitrate Bath.** The nitrate bath, or silver bath, is a solution of seven parts of nitrate of silver (recrystallized) in 100 parts of water. The water should be distilled water, or if this cannot be obtained dissolve three or four crystals of nitrate of silver in a pint of clear rain-water, and let it stand in sunlight for several days. Before the bath is used a small crystal of potassium iodide should be dissolved in it. The bath must be slightly acid. This is tested by dipping blue litmus paper into it. If it does not turn the paper red, drop a couple of drops of nitric acid into the bath and stir it well with a clean glass rod. If the litmus paper does not yet redden, add more acid, a drop at a time, and stir and test after each drop until the acid reaction is reached.

**The Dipping Bath.** The nitrate bath—as the solution is called—may be poured into a flat glass dish, and the plate immersed in it. But the better plan is to use a narrow, deep tank into which the plate may be lowered. The fingers must not be brought in contact with this bath. A piece of silver wire is bent in the form of a broad hook to hold the plate vertically, and the plate is steadily lowered into the solution. Let the plate rest in the bath for about a minute, and then for another minute gently raise and lower it, keeping it all this time entirely immersed. Now lift it gently from the bath, and notice if the surface appears at all greasy as the surplus liquid flows off. If it does, lower it again into the solution, and examine again at the end of another minute. The plate should remain in the bath for about a minute after all trace of greasiness has disappeared. This sensitizing must be done in the dark room, and in all subsequent work until fixing we must guard against white light as carefully as we do in dry-plate work. When the plate is sensitized stand it for a few moments on a pad of absorbent paper to drain.

THAASINGEN ISLAND
Ph. R. von Schoeller

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Ph. R. von Schoeller

**The Plate-holder.** The plate-holder used for wet plates differs slightly from the dry plate-holder. As we expose our plates immediately after sensitizing and then at once develop them, we do not need a double holder. The recess for the plate must be fitted with silver corners to prevent the delicate film anywhere touching the wood.

**The Exposure.** The camera should be ready, with the negative to be reduced sharply focused. Place the holder in the camera, and draw the slide. Try giving an exposure not quite double that given to a slow bromide plate, or in reducing a negative to half its size, with *f*/11 stop and a north light, direct from a clear sky, at noon, in December, try an exposure of two minutes.

**Developers.** The developer most used for wet lantern-slides is probably the sulphate of iron developer. Dissolve 120 grains of sulphate of iron in 8 ounces of water. Add 10 minims of nitric acid, and 40 minims of alcohol. Another standard developer is pyro, 10 grains; alcohol, 1 dram; nitric acid, 5 minims; water, 4 ounces. For use take pyro developer, 1 part; water, 20 parts. For pyro development the plate needs considerably more exposure in the camera—at least twice as long—than when the iron developer is used.

**Development.** The plate is placed on the suction-holder, and rather less than 3 drams of the developer is poured over it. The plate should be rocked so that the developer flows backward and forward over it, but it should not drip off the edge of the plate. There is some free nitrate of silver on the film which assists building up the image, and if any of the developer flows off the edge of the plate it carries this silver with it. The density of the image may be accurately judged, as there is very little loss of density in fixing. As soon as the image is sufficiently developed, or if the developer becomes muddy, rinse the plate gently under the tap. If in development the image flashes up and grays all over it indicates over-exposure; under-exposure is shown by a very weak image appearing very slowly.

**Redevelopment.** A collodion plate often develops very thin, and the common mode of strengthening it is to redevelop with the same solution as before, adding a little silver nitrate to it to replace that washed from the plate. Make a solution nitrate of silver, 50 grains; water, 1 ounce; nitric acid, 2 drops; and add twelve drops of this solution to 2 drams of the original developing solution. If the developer shows the slightest sign of muddiness wash it off the plate, and if necessary develop a third time.

**Fixing.** A collodion plate is fixed in hypo in the usual way. The hypo bath should be about 1 part hypo to 4 of water. Fixation will be complete in about a minute, and the plate should then be washed under a gentle flow of water.

**Toning.** A wet collodion slide usually requires toning. The pyro-developed slide tones more easily than the iron-developed one, but either may be toned. The simplest toning bath is chloride of platinum, 2 grains; nitric acid, 2 drops; water, 4 ounces. Pour the toner in a dish and lay the fixed and washed slide in it. The tones will range from brown to black. A gold toning solution is made of chloride of gold, 1 grain; water, 8 ounces. This solution should be flowed onto the plate in the same manner as the developer, and will yield a warm black tone.

**Varnishing.** The collodion film is so delicate that it should be varnished, even though it is to be protected by a cover-glass. A clear varnish is made by dissolving gum sandarac, 1 part, in benzole, 25 parts, or a commercial "crystal" varnish, such as Hance's, may be used.

**The Albumen Process.** The albumen process is sometimes spoken of as the finest of all lantern-slide processes. Very beautiful slides have been made by it, but on account of its great tediousness it has been very little worked. In fact its sole reputation may be said to be based on the fine work produced by two Frenchmen, and notably by Ferrier. Instead of using collodion the whites of new-laid eggs form the basis of the film, which is flowed on as described for collodion. Albumen plates are not obtainable commercially, and to manufacture the emulsion requires expert skill. The plate is very slow in sensitiveness and is exposed by contact to direct daylight. Like the other slow printing processes it yields very fine tones, and it is through some of the tones obtained by M. Ferrier—who kept the secret of them—that albumen has achieved its reputation. The finest results ever obtained on albumen plates are obtainable on some brands of gelatine plates, if handled by a worker who is capable, and at the same time sufficiently enthusiastic in his work to give to the gelatine plate a part of the care which must be bestowed upon albumen.

**Carbon-slides.** As carbon is coming more and more into use it will probably be much used for slide work. The delicacy of tone and range of gradation which are characteristic of carbon are of especial value in a lantern-slide. The tissue, too, may be obtained in various colors, which is an obvious advantage, giving a wide choice, without toning, and assuring uniformity of tint in any required number of slides. It will be a saving of time if the tissue is sensitized in pieces of a size larger than lantern-plate—say 6 × 8 inches—which will cut into four lantern-slide size pieces. Sensitize the tissue in a five per cent. solution of bichromate of potassium and squeegee it down onto a polished, collodionized piece of plate glass. Place it in a dark, dust-proof cupboard to dry. When quite dry the sensitized tissue will peel from the glass, and it may then be cut to lantern-plate size and the exposure made in contact with a negative. For the "safe edge" required in carbon work, a mask with a large opening will serve. The exposure is timed by an actinometer, and when it is completed the tissue may be laid down on the glass slide. The glass which is to finally support the tissue should be thoroughly cleaned and then polished with 6 grains of pure white wax in 1 ounce of benzole. Rub a very thin film of the wax evenly over the whole of one side of the glass, using a clean flannel rag. The exposed tissue is immersed in clean water until it becomes pliable, when it is squeegeed down to the waxed plate. Lay the plate on the table—tissue side upward —cover it with a few sheets of blotting-paper under a slight pressure—a book will do—for half an hour. To develop, immerse the plate in a bath of water kept at 100° Fahr., or a little over (the temperature must be kept even). The paper support will soon loosen and can be peeled away, leaving the exposed tissue on the glass. The image will appear, and when sufficiently developed remove from the warm water into a dish of cold water to set the film. Then soak for twenty minutes in an alum bath (five per cent. of alum in water). Wash well under the tap and set aside to dry.

**Collodio-bromide.** The dry collodio-bromide process is occasionally heralded as the one matchless process for lantern-slide work. In theory, perhaps, dry collodion is "superior" to gelatine, but the process is not worked commercially to any extent, and it is therefore of little practical interest.

**Clouds.** The man who first coined the term "bald-headed landscapes" did more to emphasize the necessity of rendering skies either with clouds or in a suitable tone than years of writing had done. A print of a landscape in which an expanse of sky is shown by white paper is very unpleasing, but to view a number of slides, on the screen, in which skies are represented by clear glass, causes actual physical pain to the eyes. In many landscapes and seascapes half or more than half the picture is above the horizon line, and unless some precaution is taken the dazzling white of the upper part of the picture on the screen quite overpowers the rest. The remedy is to print in a cloud sky. This may be done either by double printing on the slide or, more easily, by printing a sky on another plate and using the second plate as a cover-glass.

**Clouds on Cover-glass.** When the slide is made, choose from the stock of cloud negatives a sky which is suitable. When the cover-glass is placed on the slide the two film sides will be in contact. It will be seen from this that the pictures will be reversed toward each other, and we must therefore choose a sky negative which is lighted from the direction opposite to the landscape, so that when the sky is reversed in the finished slide the lighting will appear correct. If the cover-plate is made by contact this precaution is necessary. If the cover is made by reduction in the camera, a negative lighted from the same direction as the landscape may be selected, but in this case the reduction must be made from the back of the negative, that is, with the glass side nearest to the lens of the camera, and the film side facing the source of light. Make a mask, cut to follow the contour of the sky-line, and hold it in front of the cloud negative during exposure, moving it gently to prevent any distinct edge being shown, in such a way as to mask off that part of the glass which will cover the landscape, and have clouds printed only on that part where they are required.

If the slide is made by reduction, hold the mask behind the negative, between the diffusing ground-glass and the source of light. Some workers do not take this precaution, trusting to remove any clouds which are in the wrong place by local reduction; but the little extra trouble of the mask is well repaid in the result.

**Reducing.** Some little blending may be necessary where the sky and ground meet. We often see skies in which the clouds do not reach quite down to the horizon, and therefore it is easy to work our sky into a natural effect. For this purpose Farmer's reducer should be used, after the plate is fixed. This reducer is a solution of potassium ferricyanide in water, with a little hypo added. For our present purpose use a weak solution—5 grains ferricyanide of potassium; 1 ounce water; 10 drops of a saturated solution of hypo. With a camel's-hair brush apply this solution very carefully to the clouds which require softening or eliminating. This reducer will, if allowed, dissolve the entire image away, and a water tap should be at hand so that the reducer can be washed from the plate at any moment. If the whole plate is too dense it may be cleared by immersing in the reducer.

**Double Printing on One Plate.** Double printing of the sky and foreground on one plate is not difficult if care be used, and it has the advantage of guaranteeing a uniformity of developing and toning which has to be carefully worked for when two separate plates are used. Make first a paper print from the negative to be used for the picture, and with a pair of shears cut the print carefully in two along the skyline. One half of this print will serve as a mask while printing the foreground, the other will serve for the sky. Place the negative in the printing-frame with the sensitive plate behind it. As there will be no visible mark on the plate after we have exposed for our foreground, marks must be made on the frame showing the exact positions of the ends of the skyline, to ensure register when we print the sky. Hold the mask which is to cover the sky in position in front of the negative and make the exposure. Then take the negative out of the printing-frame and insert the cloud negative, and replace the plate. Hold the foreground mask in front of the cloud negative to cover the lower part of the plate and make the second exposure. If a reduction is made in the camera, shield the negative in the same way, and while the sky negative is being substituted for the landscape one, close the slide of the plate-holder. The mask in this case is held behind the negative and between it and the source of light.

**Blending.** In spite of precautions it may happen that we do not get a good joining of land and sky. If a cloud slightly encroaches on the land it will, in most cases, not be noticeable. If it is, the best remedy will be to make another slide. If the sky appears too strong near the horizon, Farmer's reducer, still further diluted, may be very carefully and sparingly used.

**Compensating Cover-glasses.** For years slide makers were content with their clear glass skies, but now they are rapidly awakening to the advantages of clouds. It has remained for an American worker to practically demonstrate that the pictorial possibilities contained in the modifying influences of cover-glasses are by no means fully understood. By devoting all the care which is usually bestowed on the most intricate of prints to the making of a lantern-slide, Alfred Stieglitz has produced some work which has set a new pace in pictorial effect. In brief, his process is to make, by contact, a very thin under-exposed (negative) copy of his *slide*, and use this negative copy as a cover-glass. In the case of a sky which was clear glass in the slide, a negative made from this would be very dense. But if we very much under-expose our contact negative, the sky in it will be very thin. If this negative is used as a cover-glass, and the slide shown in the lantern, the light will pass through the thin sky, and will be modified so that it no longer reaches the screen as clear white light. Where we have representations of reflections, as in water-scenes or "wet-night" scenes, this compensating cover-glass often turns what might be a mere clever slide into a picture. The method is simple in outline. Place the finished slide, after it has been washed and dried, in a printing-frame, and in contact with it place an unexposed lantern-plate. I say in contact, but the plates must be separated by laying a mask between them. This slight separation allows a slight diffusion of the light. Were the plates printed in absolutely close contact their separation to the extent of the thickness of a mask, when shown in the lantern, would result in a narrow line or halo of whiter light around our modified high lights. Give a very brief exposure. If the lantern-slide received 15 seconds exposure, 1 second will probably be sufficient in this case—we want a mere ghost of a negative. If this negative after development is placed over the slide, in exact register, it will tone down every high light, for where we have clear glass in the positive transparency, we shall have the densest film on the negative cover-glass. If the two are temporarily bound together and projected in the lantern, or examined by a strong light in the lanternoscope, any place in which the correction of values has been overdone may be noted, and when the glasses are unbound, local reduction, with a brush and Farmer's reducer, may be worked to any extent.

**The Final Operations.** When the slide is finally toned and dried we reach the operations of covering with a glass, masking, and binding—necessary for the protection of the delicate film from injury, for the slightest scratch or flaw would be unpleasantly magnified on the screen.

**Masks.** A mask is a piece of opaque paper cut to the size of the lantern-plate—3¼ x 4 inches—with a cut-out centre through which the picture is seen. This inner opening of the mask serves as a boundary or frame to the picture when thrown on the screen, and may be of any size or shape which is considered most suitable. Usually for slides made by contact—where we wish to obtain as much of the picture as possible—a large square or oblong opening with slightly rounded corners is used. In the case of a slide by reduction the picture is nearly always—though not necessarily—made smaller. There are many standard shapes of cut-out masks on the market, and a sample box of assorted shapes can be purchased from any dealer. These shapes are either round, oval, various forms of dome—that is, square lower corners with a rounded top—square or oblong. The square and oblong, often with their corners slightly rounded, are the favorite shapes. In choosing a mask we are practically trimming our picture, and have room for the exercise of all our skill. When the proper mask is chosen the plate should be laid, film side uppermost, on a white sheet of paper on the table. Everything at this stage should be thoroughly dry, and it is well to heat both the plate and the mask. The mask is laid carefully in position on the film, and a cover-glass is placed over it. The cover-glass and the slide are then firmly bound or glued together by a narrow strip of thin paper run round their edges.

A very convenient mask, or mat—as often called—is the Olmsted. This is a piece of paper the size of a slide, but without the opening cut in it. One side is white, and on this side a number of crossed lines are ruled in such a way that by following a set of lines with a sharp knife any desirable size or shape of opening may be cut out.

If the worker wishes to make his own masks he may obtain a few templates—which are sheets of brass or zinc with an opening cut in them—from any large photo-supply house or hardware store. With these a pivoted wheel-trimmer should be used to cut the paper. A method of making dies was suggested some years ago by, I believe, Jos. P. Beach, of New York, and to those who can use carpenters' tools, and who may not require a great variety of patterns of masks, it may be useful. The method suggested consisted in taking a block of hard mahogany, apple, or pear wood, with the end grain upward and about an inch and a quarter thick, and as large in size as an ordinary lantern-slide plate. Mark upon the surface with a lead pencil the form and size of the mat wanted, but perhaps a trifle smaller than the actual size. Then with proper tools—chisels and files—take from the block, a half an inch in depth, the wood, until it assumes the oval or square marked out. Around this wood form an old clock spring or other piece of thin steel is bent and fastened by screws to the wood. Holes for the screws should first be punched in the spring, and when ready for fastening the spring may be held tightly to the wood by means of a vise. When the spring entirely circles the wood the joining of its two ends will require some little care. Either they must exactly meet, or what is easier, slightly overlap, in which case they must be very finely filed down. As a clock spring is too thick to be a good cutting edge it should be filed, from the inner side, before mounting, to a sharp edge. If the steel is too hard to be workable the temper may be softened by heating it in a fire and plunging it among the ashes to cool. This die, when made, should be placed on the table with its cutting edge upward, and over it three or four thicknesses of the mask paper are laid. Another block of hard wood is placed on the paper and a few light taps of a hammer on it are sufficient to cut the masks.

A simpler method, and one allowing the greatest amount of discrimination in choosing the size of the mask, is to cut needle-paper into strips about four inches long by one inch wide. The slide should be placed film side up as before on the white sheet of paper, but on the paper two straight lines should be ruled, meeting at a right angle. The plate is moved until the lines on the paper exactly show the part of the foreground and one side to be masked off; then two pieces of paper are slightly moistened and carefully placed in position. The slide is then turned half round and two more strips of paper complete the mask. The only objection to this method is the slight one that the strips are dampened to ensure their adhesion to the film.

**The Paper.** The paper most commonly used for masks is a black needle-paper, opaque and tough, but thin. Some workers prefer a mask with one side white, on which particulars may be written with ordinary ink. If black needle-paper is used, any data may be written on it with Chinese white thinned with a little gum-arabic in water and used with a fine pen.

**Blocked-out Masks.** A suggestion, due to Paul Martin, may often be utilized with advantage. It is to block out any background or undesirable features from a plate by the use of some opaque medium such as Indian ink. This makes of the pictures a kind of "living statuary," and is especially useful in such subjects as street scenes or photographs of caged animals where the houses over the way, or the barred fences, unduly distract the attention. Take the slide to be blocked out, and with a little Indian ink diluted with water very carefully paint round the outline, using a fine sable or camel-hair brush. If a false stroke is made, the whole may be washed off with water, and when the slide is dry a fresh start made. When an opaque line one-eighth inch broad has been painted around the outline, the rest may be blocked out with a larger brush, or a paper mask may be cut to cover it.

**The Cover-glass.** The cover-glass should be very clear and thin and free from blemishes. The thinness of the glasses used in lantern-slide work is a concession to weight, and is so universal that if a very thick glass were used for cover, the slide might jam tightly in a lantern when shown and cause trouble. The glass is placed in register carefully over the slide and mask, and the whole is ready for binding by means of a strip of paper around the edges of the glasses.

**Cleaning Glass.** The troublesome question of the disposal of spoiled negatives is in part solved for the slide maker. He can at least use the glasses from his spoiled transparencies as cover-glasses. To cleanse the glass place it in a pan, film side up, and pour over it a hot, strong solution of washing soda in water. By the time the solution is cool, the film should easily leave the glass if scraped with a flat piece of wood cut to a chisel edge. If the film is obstinate, let it soak for an hour. When the glass is clear, rinse it well in running water and then immerse it for a few minutes in a five per cent. solution of hydrochloric acid. After a last rinse under the tap the plates should be reared on end to dry. When dry they should be thoroughly polished with a mixture of Tripoli powder in methylated spirits or wood alcohol. Mix to a thick cream and then add a few drops of ammonia. Smear the cream on the glass and wipe off and polish with a clean linen rag. If necessary, finish the polishing with a clean wash leather which has been washed in water only.

**Binding.** Binding is one of those "little things" which so often cause trouble. A binding strip is a piece of paper about ⅓ inch wide and 16 inches long, well gummed on one side. The trouble with some binding strips is that they will not adhere to the glass, but persist in sooner or later drying off. One strip which works quite satisfactorily is the *Model;* or home-made strips may be made by coating needle-paper with thin glue. The secret of good sticking is to have the strip thoroughly limp with water. Lay the damp strip on the table, and take the slide and cover-glass between the finger and thumb. Press one edge down firmly along the centre of the strip of paper. The paper will adhere to the glass and may now be raised from the table. About ⅛ inch breadth of paper will overlap each side of the slide and this must be pressed firmly down to the glass with the finger and thumb of the other hand. As soon as the paper adheres along one edge bend it carefully around the corner, being especially careful to press it well home at the corner. Rub the finger and thumb repeatedly along each edge. When all four sides of the slide are bound, tear or cut off the inch of binding strip which is left, and put the slide away to set. To facilitate this binding there is a little vise known as a "lantern-slide binder," in which the two glasses are firmly grasped by two revolvable clamps. This allows the use of both hands in fixing the strips. A useful wrinkle in binding — for which I am indebted to Andrew Pringle—is to bind with some thin, tough, porous paper, such as tissue-paper, and afterwards dip the edges of the slide into a shellac varnish.

**Naming the Slides.** Slides are named, and any required data added, either by writing on the mask, or by affixing a label to the cover-glass. When a slide is placed in the lantern the cover-glass is always placed inwards, and any distinguishing marks are placed on this side. If a mask of light colored or white paper has been used, a pen and ordinary ink will write the particulars; if black needle-paper has been used a little Chinese white, mixed with dilute gum-arabic, should be used. If the writing is placed on a label after the plate is bound the label should be glued on the cover-glass along the left margin as the picture is held right side upwards.

**Spots.** The lantern-slide is placed in the lantern with the sky downward and with the cover-glass next to the light. It is necessary to have some ready means of telling when the slide is in its right position. To secure this we gum a round label on the lower left-hand corner of the cover-glass—or if we have a label across the left end it serves the same purpose. In England—and to a certain extent in America—the distinguishing marks are two white spots, one in each *upper* corner of the cover-glass. These spots may be attached to the mask, or placed on the cover-glass after binding. I prefer the latter plan, as then any number may be written on the spot, and so a set of consecutive slides easily kept in place. If slides are made by the carbon process they will be reversed, and in this case only, the spotting should be on the slide itself, not on the cover-glass.

**Coloring Slides.** A retouching desk to hold the slide, a few oil-colors, a little megilp, a few fine brushes, and a finger-tip are all the essentials for coloring a lantern-slide. The colors used are moist oil-colors, sold in tubes for ten or fifteen cents. Any good make of colors may be used, but transparent ones only must be chosen. First comes Prussian-blue, both in transparency and ease of working. The siennas, crimson-lake, gamboge, and ivory-black are a useful minimum to commence with. I have used both Rowney's and Winsor & Newton's colors, and lately I have had much satisfaction with those of Devoe & Raynolds. This latter firm has a very useful white—blanc de laque, for thinning. Water-colors proved unsatisfactory, until the introduction of the specially prepared Elmendorf aniline colors, which work perfectly.

The materials used are not numerous. A retouching desk is the best thing to hold the slide, and beyond that nothing is necessary except a few tubes of color and some fine sable-brushes. Get the best brushes. They will last a long time, and with cheaper ones it is impossible to do good work. Ordinary oil-colors, worked with a little megilp or a little mastic varnish, do all that is required. The most useful tool of all is the tip of the third or fourth finger, which is used in spreading an even or graduated tint—usually in the sky. Before describing in detail the coloring of a slide I will explain the use of the finger-tip. It is used wherever any considerable surface has to be covered, and as a little practice is required to work it successfully it would be well to practise on a clear film before attemping to color a slide. Thin a little of one of the colors with megilp, and with a brush dab a few streaks of the color unevenly across the part of the glass to be first experimented on. Then dab gently with a finger-tip until the color is evenly spread over the required surface. Keep at it without getting hurried, and each attempt will make the work easier. A few attempts will usually be sufficient to lay an even tint, and then a graduating effect may be tried and the work merged gradually and evenly from a deep tint to the clear glass. When this can be done choose a slide to experiment on. Take one with a considerable sky, and commence the dabbing of a sky-tint with Prussian-blue, gradually thinning it down before the sky-line is reached. If a "sunset" is required a little touch of crimson-lake may be blended into the blue to form the green band through which the blue melts into the gold of the horizon, which may be indicated by a careful use of gamboge. Probably by the time this is done a good deal of the color has worked over the sky-line onto the trees or hills of the distance. This should be removed with a clean rag.

It must be remembered that in lantern-slide work we are, first and last, impressionists; that is, we do not separately touch each leaf, or blade of grass, or minute detail. A slight, even wash over the whole of the mass gives it the requisite variety and contrast of tint.

So far I have suggested only the coloring of masses, for such should, I think, be first tried. When this branch is mastered the more intricate matters of coloring such things as flowers or microscopical objects will be largely a matter of care, together with an artistic perception of the best colors to be used. It is best to use a separate brush for each color when several are used, and the brushes should be cleaned with a little turpentine. The same applies to the finger-tip after it has been used for dabbing. In taking out color, as in working clouds into a blue sky, or placing a white touch of a flower among the green of the grass, a very fine stump covered with chamois-leather will be the best tool to use. Remember that a lantern-slide is often enlarged thirty diameters or much more, and any crudeness may show too prominently on the screen. At the same time remember that the great fault of beginners is in overdoing the color; the light cannot struggle through a dense wash, and a slide which may appear gorgeous as a hand-specimen of coloring may be too dark to be recognizable on the screen. From this it follows, too, that the slide chosen should in the first place be very clear in the high-lights. When the slide is colored we face what is perhaps the most difficult part of the whole business—the drying of the slide. The difficulty is the purely mechanical one of our old enemy, dust. The film takes some time to dry, if the colors are mixed with megilp, and it is next to impossible to keep the dust away unless the slides are put away in a dust-proof box.

When it is dry the slide will present a most amateurish, unsatisfactory appearance. This is not necessarily the result of inexperience, but simply because the operation is not completed. The final step is to varnish the negative. The varnish required is a good quality of balsam mixed thinly with turpentine. As a little will go a long way, I would advise obtaining the balsam from some optician handling microscopical supplies, who keeps a special quality for mounting microscopical objects. When the balsam and turpentine are well mixed let them stand a week to allow a thorough settling of impurities. Then decant the clear solution to a clean bottle, and flow a little of the varnish carefully over the plate and drain off into another bottle. There is a word of caution here necessary. Turpentine is a solvent of oil-colors, and if a stream of the varnish is poured too roughly on the color it will mark the place; if it is flowed carefully and evenly over, the only result of its dissolving action will be a slight softening or blending of the colors. A few minutes will suffice for drying, and the slide may be then masked and protected with a cover-glass. The whole tone of the slide may be lowered by the varnishing, and, if this is observed, a similar change may be provided for by painting the next one with due allowance for this alteration.

## BOOKS.

*How to make Lantern-slides.* By S. L. Coulthurst. Simple, practical instructions for gelatino-bromide work. 80 pp. Illustrated. (1898.) Cloth, 50 cents.

*Lantern-slides by Photographic Methods.* By Andrew Pringle. A practical book, containing formulæ for all processes, including emulsion formulæ. 71 pp. Diagrams. (1897.) Paper, 75 cents.

*The Lantern-slide Manual.* By John A. Hodges. Containing full instructions for coating plates and making slides by all processes. 140 pp. Diagrams. (1892.) Cloth, $1.00.

*Lantern-slides: How to Make and Color Them.* By D. L. Elmendorf. 69 pp. Illustrated. (1897.) Cloth, $1.00.

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# NOTES

We take this opportunity to publicly acknowledge the very large number of letters recently received from readers of THE PHOTO-MINIATURE, expressing their good-will toward, and appreciation of, the special work undertaken by this magazine. The fact that we are behindhand with the work makes it impossible to reply, individually, to those who have written in this way; but we are keenly appreciative of all that has been said and done to forward the success of the magazine. May we again suggest that the best of all ways in which readers may give us practical help is to *invariably* mention THE PHOTO-MINIATURE when writing to or dealing with manufacturers and dealers in photographic supplies.

❧

The January number of THE PHOTO-MINIATURE, dealing in an interesting way with *The Blue Print and its Variations*, is now in press, and will be ready for delivery about the middle of February. There is room for a better understanding of "blue print" methods, and we believe that a little book about them will find sufficient favor to justify its publication. The February number, a practical handbook on *Developers and Development*, will, we expect, be published before the end of the month, and will be specially illustrated.

❧

*Telephotography: An Elementary Treatise on the Construction and Application of the Telephotographic Lens.* By Thomas R. Dallmeyer. 148 pp., small 4to. With 26 plates and 66 diagrams. Price, $4.00 net. New York: Tennant & Ward.

Carefully, simply, and clearly, with few words and many apt illustrations, Mr. Dallmeyer tells, in this handsome volume, the story of the telephotographic lens—how it is constructed, its purpose and application, and its practical use. There has been a constant demand, of late years, for an authoritative explanation of the full significance of telephotography, and it is peculiarly fortunate that the first book dealing with the subject (for American and English readers) should come from the

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famous optician to whom is due the first description and commercial introduction of the telephotographic lens. The titles of the various chapters will sufficiently explain the scope of the book, viz. :—Preface and Historical Notes; I., Properties of Light; II., The Formation of Images by the "Pinhole Camera" and its Perspective Drawing; III., The Formation of Images by Positive Lenses; IV., The Formation of Images by Negative Lenses; V., The Formation of Enlarged Images : *Part* 1—By Two Positive Lens Systems : *Part* 2—By a Positive System and a Negative System Combined (The Telephotographic Lens); VI., The Use and Effects of the Diaphragm, and the Improved Perspective Rendering by the Telephotographic Lens; VII., Practical Applications of the Telephotographic Lens; VIII., Working Data (Exposure, Development, etc.); Abridged Formulæ for Reference; Bibliography. Chapter V., as a matter of course, contains the heart of the book; but the interest is remarkably well sustained throughout, and the method of teaching adopted is one readily grasped by the average photographer acquainted with the action of photographic lenses.

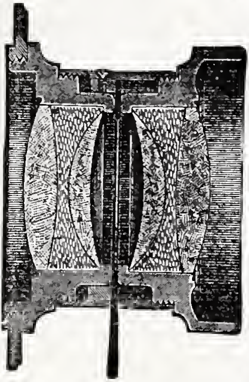
For the general reader the interest of the book will probably centre in Chapter VII., on the practical applications of the telephotographic lens. What is here said of the advantages of the lens in portraiture will, we believe, surprise the intelligent portraitist unaware of its use in this field. The application of the lens in medical and surgical photography, for groups and hand-camera work, long-distance photography, interiors, animal and bird life, in war, balloon, and solar photography, all are treated and convincingly illustrated in this chapter.

The numerous engravings throughout the book offer thoroughly good examples of telephotographic work, and are accompanied by interesting data. We commend the volume as one which will, undoubtedly, give the fullest satisfaction alike to the student and to the practical man.

◆

There are indications that the year will develop more or less lively competition in the manufacture and retailing of photographic apparatus and materials. Our readers are already informed of the combination of interests effected by the principal manufacturers of sensi-

# GOERZ Double Anastigmats



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Catalogue on Application

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tized papers. Closely following comes the news that the Rochester Optical Company, the Rochester Camera and Supply Company, the Monroe Camera Company, and the Ray Camera Company, all of Rochester, with the Western Camera Company, of Chicago, have been organized in one concern as the Rochester Optical Camera Company, capitalized at $3,500,000. We are now informed that the manufacturers of hand-cameras and printing-papers not included in the foregoing combinations have themselves combined under the title of the Photographic Manufacturers' Association of America. The Association, according to the report before us, includes the Scovill & Adams Company, of New York; John Carbutt, Willis & Clements, the Bullard Camera Company, the Manhattan Optical Company, the Kozy Camera Company, Defender Photo Supply Company, Vive Camera Company, Gundlach Optical Company, New York Dry Plate Company, and G. Gennert. Mr. W. I. Lincoln Adams is the president, M. B. Hoyt, secretary, and F. H. Hoge, treasurer of the association. Inasmuch as the makers of dry plates, publishers of photographic journals and other important photographic interests do not appear in the "make-up" of these various combinations, we may still enjoy the excitement of waiting for further developments. Meanwhile the combinations already organized will make things lively, and the wide-awake consumer should keep his eye on the market. The general forecast is, rising temperature, sultriness, cyclonic storms, and general disturbances, followed by considerably colder weather, with a touch of frost over a wide area.

❧

"When in doubt use *Pyrox*" should be the motto of the man behind the developer department of the M. A. Seed Dry Plate Company, for *Pyrox* is a developer which has not had the publicity it deserves—a developer in which good pyro and something else have been "mixed with brains *quant. suff.*," as the sarcastic text-books put it. Some days ago we tackled the development of half a dozen negatives; subject, a group comprising a two-year-old boy, four-year-old girl, three dolls, and a maiden aunt, taken indoors at noon with a leaden sky and a flurry of snow outdoors; exposures, from two to six seconds—all insufficient. Results: five failures with three approved developers, and one fairly success-

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ful negative developed with *Pyrox*. It was remarkable to see what *Pyrox* did with that negative and an exposure of barely three seconds.

◆

The Art Institute of Chicago and the Chicago Society of Amateur Photographers announce a Photographic Salon, which will be held at the galleries of the Art Institute from April 3d to 18th next. "The purpose of the Salon is to exhibit that class of work only in which there is distinct evidence of individual artistic feeling and execution; the pictures to be rigidly selected by a competent jury," as follows: Alfred Stieglitz, Joseph T. Keiley, Clarence H. White, Miss Eva Lawrence Watson, and Ralph Clarkson. The co-operation of advanced workers at home and abroad is cordially invited. Particulars of entry and forms may be had from F. W. Lawrence, 65 State street, Chicago.

◆

*The British Journal Photographic Almanac for 1900.* Edited by Thomas Bedding. 1,516 pp. (text, 500 pp.; advertisements, 1,016 pp.) With numerous illustrations. London: Hy. Greenwood & Co. New York: G. Gennert. Paper covers, post free, 70 cents.

For the man who desires a comprehensive survey of the photographic activity of 1899, from the British point of view, the *Almanac* is, without the shadow of a doubt, *the* one book wherein he may most fully satisfy his desires. Aided by the remarkable enterprise of the British advertiser, who here and there "spreads himself" over sixty odd pages, Mr. Bedding has accomplished his herculean task with complete success. The volume includes (apart from the more or less complete catalogues of over two hundred firms dealing in photographic supplies) a review of the year's work, a hand-book on Stereoscopic Photography, seventy-six papers on as many different subjects by contributors, an Epitome of Progress in Methods, Some Patented Inventions of the Year, Recent Novelties in Apparatus, Practical Notes and Suggestions of the Year, Notes on Some Iron Printing Processes, Miscellaneous Information, Standard Formulæ and Tables, and an additional one hundred pages of varied information packed in front of the foregoing, apparently inserted to make sure that the pur-

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chaser should get his money's worth. It is a book which everybody buys, or should buy, but which nobody reads, or should attempt to read, through; to be dipped into at leisure, or glanced over, like a biographical dictionary or census report. We are distinctly grateful that the *Almanac*, like Xmas, "comes only once a year."

❧

By an error in type-setting the Hammer Dry Plate Co.'s advertisement in THE PHOTO-MINIATURE has appeared to make the absurd claim that "Hammer plates will not frill in hot water." For "hot water" read *hot weather* and you get the fact in the case. The Hammer plate is a good all-around plate, and a particularly good hot-weather plate, but we would not advise the hot-water test.

❧

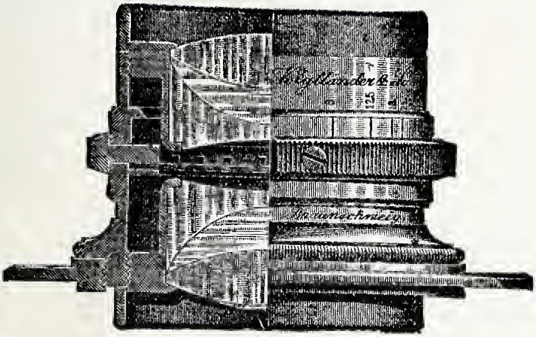
The frontispiece of *Wilson's Photographic Magazine* for January is an uncommonly good example of portraiture as it should be done. It was made by C. C. Kough, a professional, of Greensburg, Pa., and embodies a new idea in lighting the subject which is described in the magazine.

❧

The *Rembrandt* Head Grounds, just introduced by Geo. Murphy, 57 East Ninth Street, New York, deserve a word of mention as peculiarly useful for amateur portraiture at home. They give a graduated area of 4 × 5 feet, and at a dollar apiece are remarkably good value. The new background announced by W. P. Buchanan, Philadelphia, at a dollar, giving six changes of effect in a single ground, is another specialty of the same sort which should not be overlooked. For those who seek richer effects, such as the dainty miniature grounds (which give the picture image encircled by a miniature frame of tasteful design), Seavey's *Miniature* grounds are decidedly the best of their class. Amateurs or professionals seeking exclusive designs in backgrounds should see Seavey's reproductions of new effects before purchasing.

❧

A new carbon paper, similar to the Artigue Velours paper of a few years ago, has been placed on the market in France. It is obtainable in several tints. The Artigue



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paper, as will be remembered, was a direct carbon paper which did away with the necessity of double transfer in printing, and gave prints of such delicacy of detail and gradation as to be indistinguishable from fine platinotypes.

Speaking of platinotype prints reminds us that it is time someone entered a strong protest against the ridiculous waste of platinum paper evidenced in much of the platinotype work sent to our table from amateur and professional photographers. We may fairly say that less than two platinotypes out of a dozen reaching our table show any knowledge of the capabilities of the paper, of its manipulation, or of the ability to decide when its use is advantageous or otherwise. The craze for platinum prints is widespread, and the average worker seems to labor under the delusion that so long as a picture is printed on platinotype paper, it must be artistic, whether the print is technically good or bad, or whether the subject is suited to the variety of platinum paper or not. The fact of the matter is that a good platinotype print requires a great deal of intelligent care in its making, and that half the battle depends upon the choice of the variety of paper employed, its texture, tone, and the adaptation of the development of the print to the character of the subject. A careful reading of THE PHOTO-MINIATURE, No. 7—*Platinotype Processes*—will give practical aid in the obtaining of the best results.

❧

A new sensitive film, just introduced in England, differs from all others in that it is not coated upon any support, such as glass, celluloid, or paper, but consists simply of two emulsions of different sensitiveness coated in contact with each other. This gives one the additional advantage of working with either side, besides all the practical advantages of a double coating so far as halation, etc., are concerned. One side of the new film has a matt surface, the emulsion of this half of the film having a sensitiveness of 120 Watkin, or 78 Wynne. The other half (or other side) of the film has a smooth surface, and a speed of 23 Watkin or 15 Wynne. The thickness of the film is such that it lies flat in manipulation, the developer penetrates very rapidly on both sides and development is considerably shortened. The

PONY

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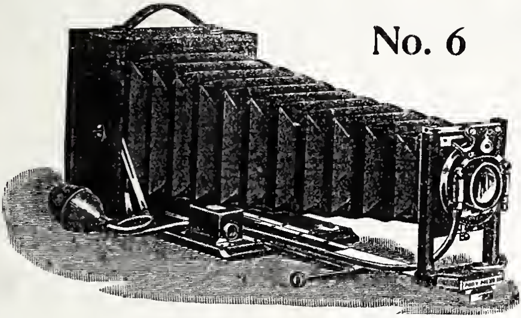
No. 6



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negative enlarges about 25 per cent. during development and washing, but this enlargement is quite regular and can be obviated by the use of a bath of wood alcohol. In manipulation a tray larger than the negative is used, to allow for the enlargement of the film; pyrocatechin is the developer advised, and the films are previously treated in a bath of formalin and bromide of potassium. They are supplied in rolls and spools for daylight cartridges. These particulars are gleaned from the maker's announcements, and make it clear that the new films are by no means as simple in manipulation as the ordinary film or dry plate.

◆

Mr. John Beeby, the amiable librarian of the New York Camera Club, has recently been awarded several medals at English exhibitions where his work has been shown. His latest success was at the Borough Polytechnic Exhibition (London), December 28th, where he received a medal for a set of lantern-slides.

◆

The following report upon the trade in photographic paper in Germany, furnished by the British vice-Consul at Frankfort, and reprinted from the *British and Colonial Printer*, offers information of general interest:

> In Germany, hitherto, there have been used for the cyanotype or "blue-print" process only the ferroprussiate paper (white lines on blue ground) and the ferrogallic paper (black lines on white ground). These papers, in respect to durability, high sensitiveness, and simplicity of use, have been constantly improved and are being exported in large quantities. . . .
>
> Albumen paper and unglazed salted paper are largely used by the old photographic establishments, and are supplied by the following manufactories: Vereinigte Fabrik Photographische Papiere, in Dresden; Dresdener Albumen Paper Manufactory, in Dresden; Trapp and Münch, Friedberg. These papers are recognized as of the best quality the world over. Of late a new paper has obtained a good footing. It is of the emulsion-albumen order, and is known as protalbin paper. It is sold by its inventor, Dr. Lilienfield, at his protalbin factory in Vienna; it is also produced by the Vereinigte Photographische Papiere, in Dresden, Saxony.

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| 4x5, No. 4 Bulls-Eye, etc. (4″ spool) | .45 | .35 |
| 5x4, No. 4 Cartridge Kodak (5″ spool) | .45 | .35 |
| 7x5, No. 5 Cartridge Kodak (7″ spool) | .80 | .60 |

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The formerly much-used chloride of silver gelatine paper has now a limited demand, coming mostly from amateur photographers. It is a specialty of manufacture with Ed. Liesegang, in Düsseldorf, and Alb. Peltzer, in Wichrath, and is also made by most of the collodion paper manufacturers. Of foreign makes, the *Solio* paper of the Eastman Company is alone worth quoting. A sort of calcium paper is also imported from L. Sevaert, Antwerp.

Collodion paper, both glossy and matt, is now more widely bought by amateurs and professionals. The factories preparing this paper are divided into two classes —those that use only the Rives plain paper and those that work the German plain paper. The former have formed a trust, under the lead of the Vereinigte Fabrik Photographische Papiere, in Dresden. The principal factories that have not entered this combine are: Chemische Fabrik, E. Schering, Berlin; Ernst Colby & Co., Zwickau; Rhein Emulsions Fabrik, E. Stolle, Cologne; van Bosch, in Strasburg; Dr. Lüttke-Arndt, in Hamburg; Dr. Opity & Co., in Munich; Walter Münch & Co., in Carlsruhe; van Dyck, in Aix-la-Chapelle.

Platinotype paper is nearly all furnished by the Platinotype Company, of London, which commands the German market. Only a few of the most prominent photographic establishments produce this paper themselves or use the German article, which is made by Dr. Rich Jacoby, in Berlin. This, however, owing to its excellent quality, is rapidly growing in favor.

As long as bromide paper was little used, the Eastman Company and Ilford supplied the demand. In addition to others imported from England, those made by Dr. Just, Vienna; Lumière et Fils, Lyons; Wellington & Ward, England, and Velox paper, from the United States, are used; but the bulk is supplied by German factories, many of which have sprung up during the last few years, furnishing an excellent article. Among these the following deserve mention: Dr. Stolger, Berlin; Chemische Fabrik, vorm. Schering, Berlin; Neue Photographische Gesellschaft, Berlin; Dr. Ruebinsam, Berlin; Posseldt, Berlin; Vereinigte Fabrik Photographische Papiere, Dresden; Rhein Emulsions Papier Fabrik, Cologne; Photographische Gesellschaft, Düsseldorf.

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◆

The Richmond (Indiana) Camera Club is a thriving institution, boasting twenty-six active members, including no less than five professors, and a programme for 1900–1 which might well make many a bigger club turn green with envy. Secretaries of moribund camera clubs (they abound) in search of inspiration would do well to apply to Secretary C. W. Hasletine, of the R. C. C., for a copy of the new programme. It is a credit to all concerned.

◆

Two clever examples of street photography at night, showing State street, Chicago, with the Memorial Arch and holiday illuminations, have been received from M. L. Masure, of that city. The following information concerning his method of working is interesting: The plates used were Seed's 26*x* *Non-halation*, backed with a syrupy mixture of lamp-black, honey, and alcohol. The exposure, with a Zeiss *Anastigmat*, Series IV., was twenty minutes, and a solid spot of black was put at the centre of the lens, about half the size of the stop used. This latter device was the result of experiment to lessen the glare of the electric lights and give greater general brilliancy, and its use proved of great advantage. The developer was a mixture of pyro and potash, a weak solution being used to avoid harshness in the lights of the picture. Particulars of this kind are always welcome when readers of the magazine send examples of work technically difficult.

◆

The Royal Photographic Society (London) has inaugurated a series of "one-man" exhibitions at its new home in Russell Square, and J. Craig Annan, of Glasgow, has promised to furnish the first display of the series. Mr. Annan has proved himself, by his work, to be a master in pictorial photography, and the exhibition will, undoubtedly, be one worth going far to see. Speaking of "one-man" shows, the January exhibition at the rooms of the New York Camera Club comprised an interesting display of the best recent work of Miss Mathilde Weil, of Philadelphia. Miss Weil is a professional of

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the "new school," and has produced some decidedly clever portraits. Her treatment of the subject is notable for breadth and individuality with extreme simplicity.

The February exhibition of this Club will present the work of Chas. I. Berg; March, the work of Joseph T. Keiley; and April, that of Miss Eva Lawrence Watson, of Philadelphia. These "one-man" shows are exceptional opportunities for the study of pictorial photography as interpreted by skilled workers, and should not be overlooked.

❧

Probably no man is so widely known in the photographic world of to-day as Captain Abney, whose contributions to photographic research and literature cover over a quarter of a century. Hence the subjoined note on his public career, from the London *Amateur Photographer*, is of general interest. Captain William de Wiveleslie Abney was born in 1843, and from 1873 to 1881 was captain in the Royal Engineers, when he retired. He was made a Fellow of the Royal Society in 1876, and received the Rumford Medal in 1882 for his researches on radiation. Two years later he was appointed Assistant-Director for Science in the Science and Art Department at South Kensington, and Director in 1893. In 1899 he was appointed to the office of Assistant-Secretary of the Science and Art Department. He was President of the Royal Astronomical Society, and for some time President of the Royal Photographic Society, in which office he was succeeded by the Earl of Crawford. Captain Abney has been President of the Camera Club as long as most of us can remember, and a few weeks ago he was gazetted as the recipient of the royal order of K.C.B.

❧

A Twentieth Century International Photographic Exhibition is to be held at Birmingham, England, during March and April. Medals are offered in various classes as follows: 1 gold, 11 silver-gilt, 4 silver, and 12 bronze, with 14 diplomas. Full particulars may be obtained from W. D. Welford, 19 Southampton Buildings, Chancery Lane, London, W. C.

❧

Cadett and Neall have recently published full particulars of the two kinds of orthochromatic light-filters which

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A very limited edition of the above monograph has been reprinted from "Camera Notes" for those who desire information concerning the "glycerine method" and the obtaining of color effects in the development of platinum prints. Copies may be had, carefully packed, at $1.00, net, per copy, post-free, from

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they issue for use with their *Lightning Spectrum* Plate. That which is adjusted to render all colored luminosities with approximate accuracy is called the "Absolutus," and with this the exposures must be increased to twenty times under glass, as in a studio, or forty times out of doors. The second kind, called the *Gilvus*, is only intended to render violet, blue, and green in their relatively correct values, leaving the red uncorrected. For a great many out-door subjects and in portraiture, where there is little red, this light-filter would probably be all that is required, and it has the additional advantage of only increasing the exposure about three or four times. The concession implied by the issue of the *Gilvus* filter is one which will be appreciated by the average out-door worker.

◆

Among the first to publicly point out the practical value of THE PHOTO-MINIATURE, No. 6—*Orthochromatic Photography*—was that trusty counsellor, Dr. John Nicol, the veteran editor of *The American Amateur Photographer*. In recent issues of his magazine Dr. Nicol has himself taken up the advantages of orthochromatic methods, and the series of papers is one which should be read by all who desire to make improvement in their work.

◆

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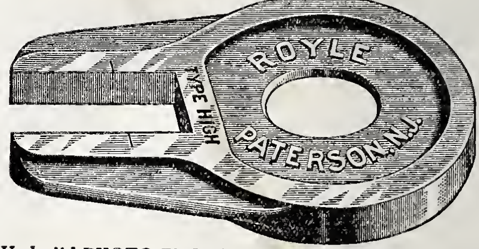

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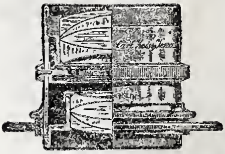

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Vol. I JANUARY, 1900 No. 10

# THE "BLUE PRINT" AND ITS VARIATIONS.

The indifference of the photographic world to the "blue print" is one of the seven wonders of that little world. It is one of the few things in photography about which even the amateur is not curious, which he accepts with unquestioning faith, rather than as a subject for inquiry. If he is asked about it, he is apt to reply as the ancient mariner replied when questioned as to the precise meaning of the phrase "the trough of the sea." "The trough of the sea? Why—it's—the trough of the sea, to be sure." To the photographer, amateur or professional, the blue print is a blue print and nothing more. If he has made blue prints, as most amateurs do in their salad days—using the commercially prepared paper, after the usual fashion of the novice—his impression is that the blue print is something cheap, and horribly blue. Why inquire further! It is used very largely by architects, draughtsmen, and engineers as an easy means of obtaining duplicate prints from their line drawings; but for photography? it is altogether too blue. On the one hand we have indifference, on the other hand prejudice.

This prejudice against the blue print because of its color is, in itself, curiously interesting. In every-day life we are inclined to be enthusiastic about everything blue, from the deep blue of the sea or the deeper depths of blue in a woman's eyes, to the marvellous blue of old Delft ware or the Willow plates of years ago. The collector will rave over an old blue Tokyo vase—over its infinite depths of blue, and the plain, every-day woman will sigh ecstatically over the tremulous blue of a bit of turquoise. But let the collector or the plain, every-day woman take to photography, and straightway their color fancies turn to sombre tones of brown, or gray, or black, with now and again a touch of red to break the sad monotony. Let us be reasonable. The blue print has its uses and its own peculiar beauty. It offers us not only the blue of heaven, or the magic blue of Delft, but also the imperial purple, the dull green of jade, and a variety of allied tints. For a certain range of subjects, which should be carefully considered, the blue print or some one of its variants, will give us a wholly satisfactory presentation of the object photographed, as, for instance, cloud forms or a stretch of sea and sky, certain classes of interiors, snowscapes and the like. For convincing proof of this let the interested reader ask J. C. Miller, M.D., of Denver, for a selected print on his *French Satin, Jr.*, and mount it, with ample margins, upon a soft gray card, such as the Alissa gray made by Collins, of Philadelphia. If the subject is appropriate, the finished print will present a richness of effect which can hardly be equalled by any other photographic process. No advertisement is herein intended. I offer the suggestion as the simplest means whereby my readers may see the blue print in its perfection, and I am sure that the pleasure of the adventure will fully repay the trouble involved.

Apart from its color possibilities, the blue print is like unto every other print of the better sort. It possesses an abundant capacity for giving detail, and a wide range of tone from light to dark. It gives a visible image during printing, is without gloss (we may burnish it, for special effects); it is simple in preparation and manipulation, and absurdly inexpensive. As a ready means of obtaining first proofs from our negatives—proofs intended merely to show the qualities of the negative, or as a guide to the choice of form, surface texture, paper, etc., for the final print, or as an index of our negatives for record or reference purposes, the blue print is invaluable. Its usefulness for obtaining copies of plans, drawings or engravings, of the same size as the original, without recourse to the camera, has already been mentioned. The facilities it offers for making large prints on paper or fabrics from designs or negatives, for decorative purposes, such as panels for doors, screens or walls, are obvious. Other uses will suggest themselves as we become more familiar with the subject and its applications in the minor arts and handicrafts.

**Iron Printing Methods.** One of the chief reasons urging me to deal with the blue print in THE PHOTO-MINIATURE, however, is that it introduces us to a very interesting group of photographic printing processes based on the light-sensitiveness of certain salts of iron* (ferric salts). The title of this little book should, therefore, properly read, *Some Iron Printing Processes,* as more comprehensively revealing its purpose. When I speak of the iron printing processes as interesting from the amateur's point of view, I refer not only to the character of the resulting prints, but chiefly to their interest as processes, offering in their manipulation innumerable opportunities for getting a practical knowledge of many things which will be found profitable in general photographic work. Speaking of the iron printing methods from this standpoint, an expert in their manipulation and teaching says:

**Attractions: Advantages.** "A few years ago, when called upon to conduct a summer school of photography, it was made a gratifying success, both in numbers and in the enthusiasm and progress of its students, by giving blue printing a prominent place in the announcements, and making that process the first of a series of practical courses of practice. No one can fully realize the fascination of this simplest of photographic processes, or the resources it furnishes for self-instruction, until he has seen it properly presented before an assemblage of persons of average intelligence, and for them made introductory to all the elementary principles of photography, to the characteristics of negatives, to printing manipulations, and to that photographic sense upon which subsequent photographic

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* In chemistry the compound which results from the mutual action of an acid with a base, is called a *salt.* The term *base* is applied to certain compounds which, when they combine with acids, form *salts.* Hydrated ferric oxide (or iron sesquioxide) is such a *base,* and the formation of an iron *salt,* ferric citrate, is shown as follows:

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| Hydrated ferric oxide<br>(*base*) | *combines with* | citric acid<br>(*acid*) | *to form* | Ferric citrate or citrate of iron<br>(*salt*) |

For use in the "blue" process, this ferric citrate is saturated with ammonia and evaporated, forming the double salt known as ammonia-citrate of iron. The ammonia-citrate is preferred to the simple salt because it gives a more stable image during development, and greater brilliancy in the print.

processes may be based. While many were tempted to try what seemed certain of success, and did succeed, the success, owing to the minimum of direction and supervision required by the 'blue' process, seemed much more exclusively their own than that gained in other more complicated methods. And there is nothing like independent success to whet the appetite for higher practice, and to inspire that measure and quality of confidence necessary in so many branches of photography.

"But in spite of the simplicity of the 'blue' process, there is still just sufficient of the possibility of failure to emphasize, at every stage, what is meant by photographic carefulness, photographic cleanliness, and photographic thoroughness. The comparative harmlessness of the chemicals employed, their slight cost, as well as the variety and extent of the applications of the process, combine to recommend it as an ideal introduction to photography" (Himes). The good sense of all this will be evident to us as we search into the mysteries of the "blue" processes. Let us get down to our subject, beginning, as we always do in THE PHOTO-MINIATURE, at the beginning.

**Principles.** I suppose the reader to know that the picture images we obtain in all photographic printing processes have their first cause in the change which exposure to light, under certain conditions, produces in certain metallic salts—such as the salts of silver, iron, chromium, etc. The condition essential to this change is, almost invariably, the presence of organic matter with the light-sensitive salt. This is usually supplied by the paper and its "sizing," or the gelatine, albumen, or collodion coating of the paper or other support on which the print is made. Here, then, we have the genesis of all our photographic prints: paper, or other support, coated with a light-sensitive metallic salt associated with or in presence of organic matter; and light changing (decomposing, altering) the nature and properties of the metallic salt. The explanation of this light-action and its effects in the different printing processes is exceedingly interesting, but I dare not enter into it here. It is very clearly set forth in the third chapter of Abney's *Treatise on Photography*, which, by the way, is one of the most profitable of books photographic.

**Salts of Iron.** That the salts of iron are light-sensitive. *i.e.*, susceptible to chemical change when exposed to light, seems to have been known to chemists as early as 1725. Interesting chapters devoted to this topic may be found in Eder's *Chemical Effect of the Spectrum* and Abney and Clark's *Platinotype.* Taking up the use of iron salts as a basis for photographic printing methods, we find that the experiments of Wedgewood and Davy (1802) and Fox Talbot (1834) with the light-sensitive salts of silver —which resulted in the first practical printing process (1835)—led many scientific men of that day to investigate the possibility of obtaining photographic images with metallic compounds other than those of silver. Among these scientists one of the most prominent was Sir John Herschel, and to him we owe much of our knowledge of the iron compounds. Herschel was not only the first to make known the principle upon which the photographic uses of the iron salts depend, but he also worked out and published several iron printing methods, one of which (the ferro-prussiate or familiar "blue" process) is worked to-day just as he described it sixty years ago. About 1860, Poitevin further developed the possibilities of iron salts, and during recent years Eder has added to our knowledge of their usefulness.

**Herschel's Discovery.** The all-important principle discovered by Herschel, on which most of our methods of iron printing are based, may be broadly stated as follows: Certain salts of iron—the *ferric* salts—when exposed to light in the presence of organic matter, are reduced to *ferrous* salts, thereby becoming powerful reducers of other metallic salts which are unaffected by the unaltered *ferric* salts. This may read somewhat technical, but a simple experiment will make its meaning plain even to the novice. In the dark-room (or weak artificial light) brush over two pieces of well-sized paper with a fourteen per cent. solution of ammonio-oxalate of iron (64 grains of the salt to 1 ounce of water), and dry quickly. When dry, expose one piece to sunlight, under a negative in an ordinary printing frame. Where the light reaches the *ferric* salts through the more or less transparent portions of the negative, the *ferrous* salt will be formed, and in a few minutes we will obtain a faint image composed of ammonio-*ferrous* oxalate. We now place the exposed and unexposed pieces of paper side by side in a developing tray, and pour over them a fifteen per cent. solution of potassium ferricyanide (68 grains of the salt to 1 ounce of water). In a few seconds we get a vigorous blue image on the exposed piece of paper, while the unexposed piece is unaffected by the potassium salt, and remains unchanged. By rinsing the "blue print" in water, the unreduced *ferric* salts in the exposed print are dissolved and washed away, and the image remains as a precipitate of insoluble blue pigment, generally known as Turnbull's blue—ferrous ferricyanide. The other *ferric* salts, such as ammonio-citrate of iron, chloride of iron, etc., will give the same results with similar treatment. Later we will see that by changing the metallic salt applied to the *ferrous* image, we can get prints in other colors. In this way the platinum image is secured in the platinum processes and the silver image in the *Kallitype* process. It is also possible, by various "toning" methods, to change the "blue" image to get brown, black, sepia, green or lilac tones.

A few general hints are necessary before we can intelligently take up the iron-printing methods in detail. Ready sensitized paper for many of the processes herein described may be obtained commercially; blue print paper for instance, is for sale everywhere. In this book, however, we will take up the preparation of the various papers, as well as their manipulation, so that the reader may be fully informed, and also because papers sensitized with iron salts invariably give the best results when freshly prepared.

It is almost unnecessary to point out that the results secured always depend, in a great measure, upon the choice of the "raw" paper used, the purity of the water and chemicals employed, the nature of the "size," and the carefulness of the worker. It is true that we can make "blue prints" on almost any kind of paper, and with very little attention to details, but the possibilities of the process will only reveal themselves when we are scrupulous in the preparation and manipulation of the paper, which, of course, applies to the manufacture and use of all light-sensitive papers. For those who do not care to prepare their own papers, a good commercial brand, such as *French Satin, Jr.*, *Opto*, or *E. A. Ferro-*

*prussiate* paper may be used with confidence. For blue prints on fabrics *Silkdown* is perhaps the most satisfactory of commercial products.

**Choice of Paper.**

As far as paper is concerned a very wide choice is permissible. For large prints and subjects with vigor a heavy, rough-surfaced drawing paper is appropriate. Such papers, however, must be used as soon as dry after sensitizing, as their "sizing" usually contains material which renders it impossible to preserve the sensitized paper in good condition. The beginner will do well to use ordinary, fairly stout "cream-laid" note, or any hard-sized bond paper. Later, a good plain photographic paper, such as *Rives*, should be selected. The chief requisites in paper for iron printing are first that it be free from wood-pulp or other impurities usually found in cheap papers; that it possess a fairly hard, not too absorbent, or too heavily grained surface; and that it be sufficiently tough to withstand the abundant washings required by the process. Rives, Johannot, and Steinbach (Saxe) papers will always be found equal to the requirements, and may be purchased in small quantities, as required, at stores devoted to artists', engineers' or photographers' supplies.

**"Sizes" and "Sizing."**

Many papers are sufficiently well "sized" in their manufacture to give satisfactory prints when sensitized (Himes claims to get good prints even with manila wrapping paper). Some sizing is essential (1) to keep the image on the surface of the paper as far as possible, and so prevent the dead, flat appearance of the image, and (2) to supply the organic matter essential to the reduction of the iron salts by light. Briefly, upon the quality and thoroughness of the sizing given to the paper, depend the brilliancy of the image, clearness in the whites, and general sensitiveness of the paper. Hence it is advisable, whatever paper be used, to size it one's self before sensitizing. For sizing, arrowroot is most generally used. We may employ any of the "sizes" given on pages 326, 330, of THE PHOTO-MINIATURE, NO. 7, *Platinotype Processes;* or a good size may be prepared as follows: Take one-half ounce of arrowroot flour and mix to a stiff paste with a few spoonfuls of water, being careful to rub down all lumps, etc. Then add warm water to make 22 ounces, and gently boil the solution until it is clear. Thin papers may be immersed in this solution for a minute or two; thicker papers should be fixed to a board by their four corners, and sponged with the size. Use a liberal quantity, and coat each sheet by lengthway and crossway strokes. Then, with a second (clean) sponge, lightly efface all streaks and make the surface as perfectly smooth as is possible. After being sized the paper should be hung up to dry, and not sensitized until thoroughly dried. This sizing is suitable for all the methods to be described. For sensitizing the paper we will require a few camel's-hair brushes, about three inches wide, bound in rubber (or quill, if smaller); or, in place of these, a few clean sponges, free from all grit; or a supply of absorbent cotton.

With this preliminary survey of the field we are now ready to take up separately some of the different methods of printing with iron salts, beginning with that most generally known—Herschel's *Cyanotype* or "blue print" method, already briefly outlined.

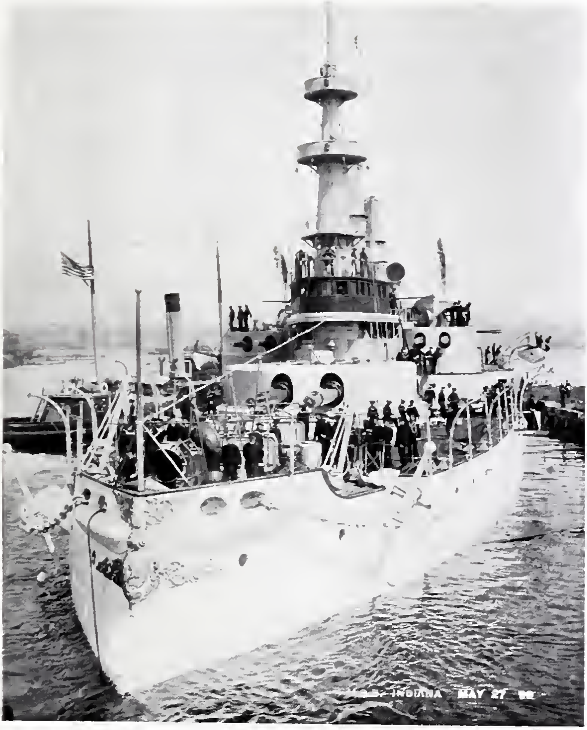
**Negative Cyanotype or "Blue Print" Process.**

This method is also known as the ferroprussiate process, or *Reverse* (*Negative*) *Cyanotype*. The latter name is given it because if we use a positive in printing, as a drawing or plan, the print will give us white lines on a blue ground, the reverse of the original. If we use a photographic negative in printing, of course, we get a positive print, blue image on a white ground.

*General outline:* Any ordinary sized paper is coated with a mixture of ammonio-citrate of iron and potassium ferricyanide ("Red Prussiate of Potash"), dissolved in water. The paper is dried in the dark, and exposed to daylight, preferably sunlight, under a negative, this producing an image in insoluble Prussian blue (*i.e.*, Turnbull's Blue). On development, *i.e.*, washing or simple immersion in clear water, the soluble portions of the image or coating are washed away, the result being a positive print, blue on a white ground. This image is unaffected by hot or cold water, and is practically permanent.

**Sensitizing Formulae.**

A great many sensitizing formulæ have been published from time to time, considerable latitude being permissible in the quantities of the salts used. The following are se-



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Leaving the Navy Yard N. Y.
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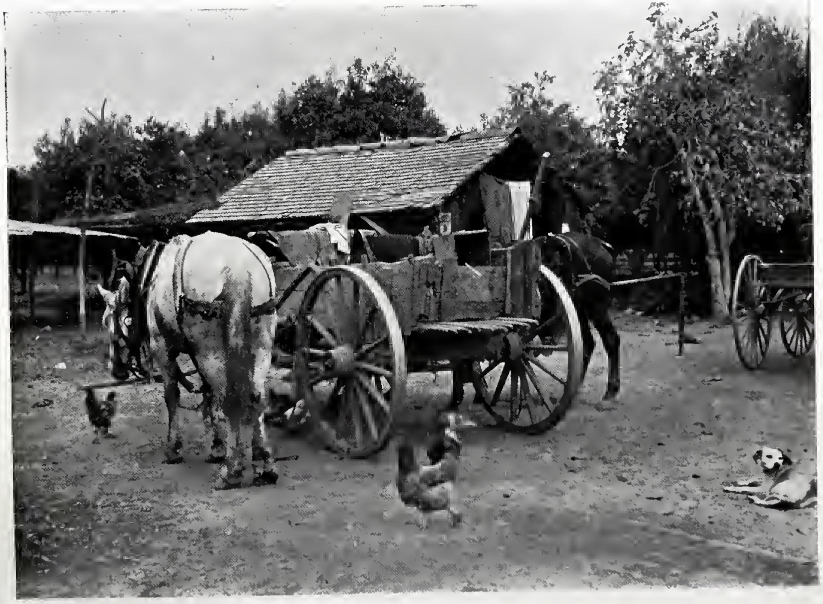


OLD MISSION FARM
At San Gabriel, Calif.
Oliver Lippincott

lected from those given by expert workers of the process, beginning with Herschel's original formula, so that the reader may see that the process is worked to-day in, practically, its original form:

*Herschel's formula:* A: Ammonio-citrate of iron, 20 parts; water, 100 parts. B: Potassium ferricyanide ("Red Prussiate"), 16 parts; water, 100 parts. Equal quantities of A and B are mixed together just before use, and filtered, to form the sensitizer.

*Millen's formula:* "Prepare the following solution, and keep it from the light: Potassium ferricyanide, 1 ounce; ammonio-citrate of iron, 1½ ounces; distilled water, 10 ounces. Mix thoroughly and filter. This solution will have a deep wine color, and dry on the paper a lemon yellow. If the solution is green and has a precipitate, the ammonio-citrate of iron is old and spoiled, or you have been given the citrate of iron instead."

*Nicol's formula:* "Prepare the following stock solutions which will keep indefinitely in the dark: A: Ammonio-citrate of iron, 3 ounces; water, 4 ounces. B: Potassium ferricyanide, 2¼ ounces; water, 4 ounces. Just before using, mix together one part each of A and B, and add two parts of water." Dr. Nicol avers that the mixed solution will give perfect prints six months or a year after being mixed, but he prefers to follow the text-books in his instruction "just before using."

*Lietze's formula:* "Prepare a stock solution composed of potassium ferricyanide, 5 ounces avoirdupois, dissolved in 32 ounces of water. This will require a day or two to dissolve, after which the solution should be filtered. When it is desired to sensitize paper, prepare a second solution of ammonio-citrate of iron, 1 ounce avoirdupois, in 4¼ fluid ounces of water. For use mix equal parts of the two solutions." Lietze observes that the mixed solution will only remain serviceable for a few days.

*Himes's formula:* A: Ammonio-citrate of iron, 60 grains; water, 4 drams. B: Potassium ferricyanide, 60 grains; water, 6 drams. "Dissolve separately and completely, then mix thoroughly in the dark, and keep the mixture from all light by wrapping the bottle in black or yellow cloth, or by putting it in a stoneware bottle. The mixed solution will keep for several months if kept from light, but should be carefully filtered before use."

*Hope's formula:* "Prepare a stock solution by dissolving 256 grains of potassium ferricyanide C. P. in 4 ounces of water. Cover the bottle with opaque paper, and label it, 'Stock solution, Red prussiate of potash. 1 dram equals 8 grains.' This will keep indefinitely. When it is desired to sensitize paper, dissolve 50 grains ammonio-citrate of iron in ½ ounce of water. This will dissolve in a few minutes. For use, mix 4 drams of each solution, filtering each through a wad of wet cotton in the process of mixing. If the paper is to be kept more than a week before use, add 1 grain of potassium bromide to the mixture."

*Stiefel's formula:* Ferricyanide of potassium (powdered), 300 grains; citrate of iron and ammonia, 475 grains; water, 6 ounces; stronger water of ammonia, 30 minims. Dissolve the ferricyanide in the water, add the ammonia, and then the citrate of iron and ammonia.

*Lambert* gives the following formulæ as reliable:

(1) A: Ammonio-citrate of iron, 120 grains; water, 1 ounce. B: Potassium ferricyanide, 120 grains; water, 1 ounce. Mix equal parts of A and B before use.

(2) A: Ammonio-citrate of iron, 150 parts; water, 500 parts. B: Potassium ferricyanide, 80 parts; potassium bichromate, 1 part; water, 400 parts. Mix equal quantities A and B. The addition of potassium bichromate is said to help in the keeping of the paper, and to enable one better to judge of the progress of printing. Alcohol is also sometimes added for the former purpose. The advantage of either is doubtful.

(3) *Suitable for absorbent or rough-surfaced papers.*

A: Gum arabic in fine powder, 1 part; dissolve in water, 20 parts; strain through muslin, and add ammonio-citrate of iron, 5 parts. B: Potassium ferricyanide, 4 parts; water, 20 parts. Mix equal parts A and B for use. The addition of the gum keeps the sensitizing solution on the surface of the paper, and gives a brighter picture with more transparency in the shadows.

The addition of 1 grain of boracic acid to Solution A in formula No. 1 above is said to give keeping qualities and more sensitiveness. The question of sensitiveness is one of much importance because one of the faults often imputed to blue-print papers is that they are slow printers, especially in dull or cloudy weather. Perhaps the most substantial advance toward increasing the sensitiveness of these papers is the employment of the *green* ammonio-citrate of iron in place of the usual dry form of the salt (brown-black scales). But there is another form of a soft gray-green color, yielding a green solution. The use of this instead of the brown variety is said to give a paper which prints fully twice as quick as the ordinary sort.

(4) A: *Green* ammonio-citrate of iron, 120 grains; water, 1 ounce. B: Potassium ferricyanide, 100 grains; water, 1 ounce. For use mix equal parts of A and B.

**Notes on Above Formulae.**

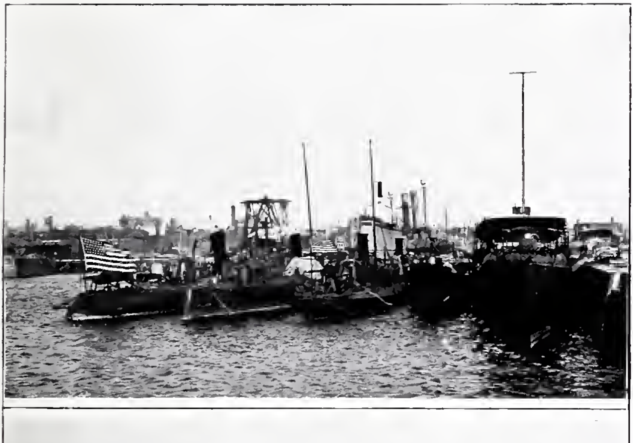
It is advisable to prepare the sensitizing solutions with distilled or rain water, or water which has been well boiled and allowed to cool. Care should also be taken to use clean bottles and well-fitting corks. Lambert states that mixtures of equal parts A and B do not keep well.

*Potassium ferricyanide*, also spelled ferr*id*cyanide, is commonly known as "Red prussiate of potash" and may be obtained at any drug store. It must not, however, be confounded with Potassium ferr*o*cyanide or "Yellow Prussiate," nor can we use one in place of the other salt. Authorities differ as to whether potassium ferricyanide is a poison or not, but it should be kept out of the reach of irresponsible persons. It should be kept in as large crystals as possible; exposure to the air causes these to change at the surface to the "yellow" salt. This coating should be brushed off (or rinsed off in a little water) before dissolving the salt for use, as its presence in the sensitizing solution will give a greenish tinge to the high lights in the resulting prints.

*Ammonio-citrate of iron.* The brown scale variety may be kept in a wide-necked bottle as it is not deliquescent. In solution it is apt to grow mouldy after long keeping, but the use of distilled water, a clean bottle, and a well-fitting stopper will prevent this. The green-scale variety is deliquescent, and will take the form of a pasty mass if kept loosely corked. Moral: Use a well-stoppered bottle. In solution it tends to mould, but the solution need not be thrown away when this occurs, careful filtering rendering the solution fit for use. The deliquescence of this variety of the salt is not commonly known, hence this detail should be noted. As there is sometimes difficulty in obtaining the green variety of citrate, it may be useful to give one or two other methods of making the sensitizing mixtures Nos. 1 to 4 more sensitive if needs be. Prepare a solution of *ferric* oxalate (not *ferrous* oxalate) 80 grains, in water 1 ounce; add 6 or 8 drops, not more, of this to each ounce of the mixture of A and B in formulæ Nos. 1, 2, and 3 as given before. In place of ferric oxalate as here suggested, we may use oxalic acid with equal advantage in connection with sensitizing solutions Nos. 1 and 2, adding 20 to 25 drops of a saturated solution of oxalic acid *(poison)* to each ounce of the mixed sensitizer, agitating as the addition is made. Where the ammonio-citrate cannot be obtained at all, the following sensitizing formula will be found useful: (5) A: Potassium ferricyanide, 1 part; water, 10 parts. B: Potassic-ferric-oxalate, 1 part; water, 12 parts. This last salt is usually a gray-green flaky powder. For use mix equal parts A and B.

**Coating or Sensitizing the Paper.**

The chief requisite in sensitizing the paper is to coat it evenly and quickly, and to dry it as speedily as possible, in order to keep the sensitizing mixture on the surface of the paper as far as this can be done. The sensitizing is done in the dark-room or by weak artificial light, as follows: Pour out into an open bowl a sufficient quantity of the sensitizing mixture, and have at hand a camel's-hair brush, three inches wide, bound in rubber; or a camel's-hair mop; or small clean sponge fixed so as to protrude half its bulk from the neck of a wide-mouthed bottle. Fasten the sheet of paper, sized side up, by its four corners to a flat board, and incline the board at an angle of 20 degrees. Dip the brush or mop in the sensitizer (do not get it too full), and steadily spread the solution upon the paper by strokes across the sheet, beginning at the top, and joining the edge of the second stroke to the first. Each stroke should coat a strip of the same width as the brush without any solution running in rivulets down the sheet. Beginners are apt to use the brush too dry or too fully charged. Do not try to be too quick, or too slow; the brush ought to run across a twelve-inch sheet as quickly as you can count ten saying the words one, two, three, etc., deliberately. When the sheet is coated by successive strips across, go over the sheet lengthwise with a slightly drier brush, *i.e.*, not so fully charged with solution. This will insure a perfect even coating when a little practice has been secured. As soon as the coating is finished, lift the paper



WAR AND PEACE

*Torpedo boats ready for service.*
*Torpedo boats laid up for repairs.*

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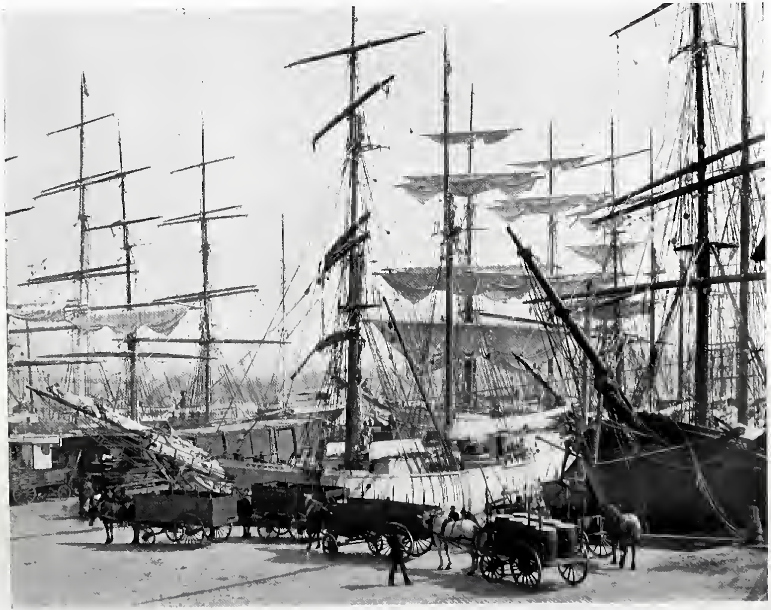


ALONG THE WATER FRONT, N. Y.
E. Muller

from the board, and hang it up to dry, aided by gentle heat. The quicker it dries the better. This can be accomplished by pinning the sheets to strips of wood, and suspending them near a stove. Care must be exercised, of course, not to let the sheets scorch or become too brittle.

**Sensitizing Fabrics.** This will present little difficulty if the reader has digested what he has already read. The fabric to be sensitized must be free from all "dressing," and quite clean, *i.e.*, free from soap, etc., and it must be sized. If the material be silk, satin, linen, or fine canvas, soak it well in hot water to remove the dressing; wash well in soapy water, and afterward rinse thoroughly in warm and then cold water to remove all traces of soap or alkali. For sizing such fabrics gelatine is advised as follows: Soak half an ounce of hard gelatine in twenty ounces of cold water until quite soft. Then heat the gelatinous mass gently until it is thoroughly dissolved. In this solution immerse the fabric for ten minutes, after which drain and hang it up to dry. To sensitize, stretch the fabric quite flat and without creases by means of a light frame set upon a board. The sensitizing mixture should be stronger than that used for paper. For instance: A: Ammonio-citrate of iron, 160 grains; water, 1 ounce. B: Potassium ferricyanide, 120 grains; water, 1 ounce. For use, take equal parts of A and B, and apply to the fabric quickly with a flat hog's-hair brush. Dry quickly before a fire.

The color of sensitized paper or fabric will vary slightly from a pale or straw yellow to yellow with a greenish tinge, according to the sensitizing formula used.

**Printing.** This is done in an ordinary printing frame. As we have seen the process is a light and shade reversing process: from a negative we get a positive in blue on a white ground; and from a drawing in black and white (positive) we get a facsimile, but in white lines on a blue ground. It is also a right and left reversing process when used with a drawing. Therefore, if we wish to avoid reversal of this kind, we must print through the paper or drawing, *i.e.*, the sensitized paper must be in contact with the back of the drawing or plan. Hence, if it is permissible, it will be advisable to make the drawing, map, or plan as translucent as possible, or on thin paper or linen. This, of course, does not apply when a negative is used.

Having placed the sensitive paper with its yellow side to the film side of the negative, lay down the felt pad and close the frame. Expose to sunlight wherever this is possible, unless the negative is unusually thin, as "blue" paper prints less quickly than silver or platinum paper. After a few minutes' exposure to direct sunlight, examine the print in subdued light, and the shadows of the image will be seen to have an olive green color. Replace the back-board and continue printing until the deepest shadows are well bronzed. The color of the sensitive surface varies somewhat with the paper used, and the character of the sensitizing solution. The brown ammonio-citrate gives a yellowish brown coating; the green variety gives a grayish-green lemon color. The general tendency of the light action is toward a violet-blue deposit.

**"Development."**

This is not really development in the proper sense of the word, for it consists simply in washing away the unaltered ferric salts (those not reduced to the ferrous condition) from the coating of the paper. This is effected by immersing the print bodily in a tray filled with clear water, so that the whole surface of the print is wetted immediately, without the formation of air-bells. So sensitive is the paper to moisture that the moisture which strikes through the paper from the back of the sheet, in those parts not wetted, will spoil the coating in these places in a few seconds, and they will appear as blue stains in the finished print.

Another way to "develop" the print is to float it on the surface of the water. Lay the dry print on a table or board. Turn up an edge of the paper—¼ inch wide—all the way round. Then place the print carefully on the surface of the water. The turned up edges should prevent the water from reaching the back of the print.

Whatever method is adopted the chemicals in the coating will be seen to float off like a cloud of color; after five minutes' washing, change the water; repeat this in another five minutes; and then turn the prints face down and let them soak for not less than 20 minutes. Do not shorten the washing because the print seems to become too light, or washes completely off the paper. These are simply signs of under-printing, and a new print must be made with a longer exposure. If the print comes from the washing dull and dark, with the lights tinted, it has been over-printed. Some authorities claim that the addition of a few drops (2 or 3) of hydrochloric acid to the first wash-water gives brilliancy or clearness to the print, but I have not found it to offer substantial advantage. The water used in washing must be free from impurities; thus waters containing lime, chalk, etc., will tend to veil the lights of the print; water containing traces of ammoniacal salts will soften and weaken the prints. After washing, hang the prints up to dry, or dry between lintless (*Royal*) blotters. If properly printed the image should gain in brilliancy as it dries.

**Titles on Prints.** Titles or designs may be secured on blue prints by (1) placing the title, etc. (reversed), on the negative with any opaque ink or vermilion color, or (2) by titling each print separately. For this prepare a ten per cent. solution of oxalic acid (*poison*). To a few drops of this add a few drops of gum mucilage. This is the way usually advised, but Lambert gives the following as preferable: For white lines on a blue ground, write with a saturated solution of carbonate of soda; for pale blue lines on a dark blue ground, use a saturated solution of ammonium oxalate; for red on blue, use equal quantities of red ink and saturated solution of ammonium oxalate. If titles, figures, etc., are desired on a plan, drawing, etc., take red ink and make it strongly alkaline with carbonate of soda; add to this about one-half its volume of gum-arabic solution, and write with a fine brush or new soft quill or gold pen.

**Under-exposure.** This is never satisfactory to deal with, and it is always better to slightly over-print than to under-print. The addition of a little ferric salt—a few drops of iron perchloride to each pint—to the first washing water is sometimes advised.

**Over-exposure.** Excessive over-exposure should be avoided as tending to loss of detail in the shadows of the print. For slight over-exposure add 5 to 10 drops of stronger ammonia water to each pint of the first wash-water; 5 drops will generally be found ample, and this reducing should be gone about with care. For further over-exposure use a very diluted solution of carbonate of soda, and after washing pass the print through a bath of clear water acidulated with a few drops of hydrochloric or citric acid per pint. For a bad case of over-printing, immerse the print in a three per cent. solution of caustic potash or caustic soda (14 grains of the salt to 1 ounce of water), until the image turns to a gray-yellow color. Now wash thoroughly and transfer to a bath of very dilute hydrochloric acid. In this solution the print will slowly regain its blue color, but with a general loss of strength. If desired, this may be repeated.

**"Toning" Blue Prints.** The number of experiments made, and formulæ published, for the purpose of converting a blue print into a print of some other color are innumerable. I give a selection of the best of these formulæ, as offered by workers who should know whereof they speak. The experiments are very interesting and the results often more curious than valuable. The reader is therefore advised to experiment with prints of little value, using a notebook and making record of the most desirable formulæ and their effects. Further, the sub-titles heading the formulæ given are to be taken as approximately denoting the color of the changed image. In my own experiments I have rarely succeeded in obtaining what "the other man" promised, although the results obtained have often been very pleasing and satisfactory. The "black" tones, for instance, are usually a purplish-gray black, or a ruddy-brown black. These may be satisfactory as "blacks" when we are making reproductions of line drawings, but with negatives, where we have delicate ranges of half-tone, the neutral character of the "blacks" is disappointing. It is specially advised that to avoid stained or discolored lights in the print, ample quantities of solution should be used, and the prints "toned" singly or in small numbers. Thoroughness of washing between operations is also very necessary, save where otherwise stated.

**"Black" Tones.** (1) Immerse the print in a five per cent. solution (25 drops per ounce of water) of ammonia, until the image is bleached out; wash thoroughly in several changes of water, and transfer to a saturated solution of tannic or gallic acid.

(2) Bleach the print in a two per cent. solution (10 grains per ounce of water) of caustic potash. Wash thoroughly, and transfer to a saturated solution of tannic or gallic acid.

(3) A saturated solution of borax may be used in place of the caustic potash solution advised in No. 2. Wash well and proceed as before directed.

(4) To one part of a strong decoction of tea, add two or three parts of a saturated solution of carbonate of soda. Bathe the print in this mixture and (according to the books) you will get "an old engraving effect in the print." In repeated trials I have obtained only stained prints, worthless for any purpose; still, the experiment is interesting, and the formula comes down from good authorities and "ancient times."

(5) "*Warm Black*" *Tones.*—Immerse the print in a 20-grains to the ounce solution of caustic potash until bleached. Wash thoroughly, and immerse in a 20-grains to the ounce solution of gallic acid. Again wash and float the print on a 10-grains to the ounce solution of nitrate of silver. Again wash, immerse in an ordinary hydroquinone or ortol developer until the desired tone is obtained. Wash well, and dry in strong sunlight.

(6) "*Warm Black*" *Tones.*—Immerse the print in a cold saturated solution of gallic acid. Wash thoroughly and transfer to a dilute solution of carbonate of soda.

(7) "*Blue-black*" *Tones.*—Print very deeply until the shadows assume a gray-bronze appearance. Wash in a very dilute solution of ammonia (2 drops per ounce of water) until the image presents a lilac tinge. Wash thoroughly and transfer to an eleven per cent. solution (50 grains to the ounce of water) of iron proto-sulphate.

**Green Tones.** Make a saturated solution of iron proto-sulphate (ferrous sulphate). Acidify it with sulphuric acid. Dilute with an equal volume of water. Immerse the previously washed print in this solution until the required tint is obtained. Wash well and dry.

**Bluish-Lilac Tone.** Among the prints Lambert sent me with his formulæ was one of a bluish-lilac tone, pleasantly contrasting with the greenish-blue tone obtained with many commercial papers. This tone was due (bluish-lilac) to the addition of a little ammonia to the *sensitizing* solution, *i.e.*, until the solution has a perceptible odor of ammonia. See

Stiefel's formula for sensitizer. By this modification clearer whites are obtained than with the average sensitizing formula.

"Lilac" tones are also obtained by immersing the print, after the usual washing, in a dilute solution of borax. A dilute solution of potassium oxalate has the same tendency. A two per cent. solution (10 grains per ounce of water) of potassium sulphocyanide gives "pink-lilac" tones. When the desired tint is obtained, blot off the superfluous liquid and expose to sunlight, then wash well and dry.

**Violet Tones.** Immerse the print in a warm five per cent. solution (23 grains to the ounce of water) of lead acetate. With a dark print this gives a bluish-purple tone.

**Notes on Above.** In all these attempts at modification it will be found that dark prints give better results than light prints, inasmuch as the toned print almost invariably loses depth and brilliancy to some extent.

*Corrections.*—Light stains may often be removed by applying a dilute solution of oxalic acid (*poison*) with a brush; deeper stains yield to a solution of carbonate of soda. See the note on reduction and over-exposure.

*Retouching, Spotting, etc.*—To prepare a pigment to match the blue print for this purpose: To a solution of ferrous sulphate add a solution of ferr*i*cyanide of potassium; or to a solution of iron perchloride add a solution of ferr*o*cyanide of potassium; in either case a precipitate of Prussian blue is obtained. Wash this well, collect on filter paper, and dry. For use mix this as required with gum water, and touch the print with a finely pointed brush. A blue chalk pencil is equally useful.

*Blue Fog.*—This is rather a common complaint until the worker has gained a little experience. It arises from the use of paper which has not been sufficiently sized, or from an excess of potassium ferricyanide in the sensitizing solution.

*To Convert a Blue Print into a Line Drawing.*—The print is made in the usual way, washed and dried. Then with a quill pen and waterproof ink go over the print and line in what it is desired to retain of the picture. Let the print thoroughly dry, and then immerse it in a solution of ammonia, carbonate of soda, caustic potash, or oxalate of potash just long enough to remove the color, after which it should be washed quickly under the tap and dried in sunlight.

*Negatives and Prints.*—Remember that the quality of the print, much of its brilliancy of detail, gradation of tone, etc., depend on the negative. No printing paper can give these qualities unless they are in the negative. A fairly vigorous negative with clear shadows will give the best blue print. The delusion that because blue print paper prints slowly it may therefore be handled carelessly in daylight, without detriment to the finished print, is responsible for many of the poor blue prints we see.

### Positive Cyanotype or "Blue on White Ground" Process.

This is the second of the iron printing methods, and is called the positive or direct cyanotype (or "blue") process because, when a positive is used for printing from, it gives a positive image, *i.e.*, if printed under a plan made with black ink on white paper, the print will show blue lines on a white ground. By the process we have already considered, you will remember that the image, when a positive or drawing was printed from, showed white lines on a blue ground. Consequently the positive cyanotype method is used almost exclusively by engineers, draughtsmen, etc., who want positive prints from their designs, which are themselves positives. From a negative the method gives, of course, a negative image.

The process was originally worked out by Sir John Herschel as a companion method to the *negative* cyanotype process. Later Pellet (1877) improved it considerably, and it is often spoken of as *Pellet's Process.* Briefly it differs from the *negative* method in that a colloid body, such as gum arabic, is added to the sensitizing solution: other ferric salts than the ammonio-citrate are made use of; and the prints are developed with ferr*o*cyanide of potassium ("*yellow* prussiate of potash") instead of the ferr*i*cyanide salt ("red prussiate").

The theory of the process is as follows: We know that the addition of potassium ferr*i*cyanide to *ferric* salts produces *no* precipitate. *Ferric* salts produce with ferr*o*cyanide of potassium, however, a precipitate of Prussian blue. We know that the reaction of potassium ferr*i*cyanide with the *ferrous* salts results in a precipitate of Turnbull's blue. The reaction of potassium ferr*o*cyanide with *ferrous* salts, however, is the production of a whitish precipitate which slowly oxidizes to a light blue. To make the matter perfectly plain let us put the reactions in tabular form :

| | Potassium Ferrocyanide. | Potassium Ferricyanide. |
|---|---|---|
| Ferric salts ....... | Prussian blue<br>(Ferric-ferrocyanide) | No precipitate |
| Ferrous salts...... | Whitish precipitate, oxidizing to blue<br>(Ferrous-ferrocyanide) | Turnbull's blue<br>(Ferrous-ferricyanide) |

**Paper and Sizing.** The paper and sizing indicated for the negative "blue" process are equally suitable for this method, as described on an earlier page.

**Sensitizing Solutions.** The following formulæ are all well recommended :

(1) A : Powdered gum arabic, 1 ounce ; water, 5 ounces. B : Ammonio-citrate of iron, 1 ounce ; water, 2 ounces. C : Chloride of iron, ½ ounce ; water, 1 ounce. First dissolve the gum and strain the solution (A) through muslin ; add solution B to solution A, stirring well ; finally, add solution C to the mixture of A and B. At first the mixture is thick and viscid, but if kept a day or two, protected from light, and frequently stirred, it becomes thin enough for brush coating.

(2) Mix in the following order : Gum arabic, 1 ounce ; water, 12 ounces ; iron perchloride, 1 ounce ; oxalic acid, ½ ounce.

(3) Gum arabic, 50 grains ; water, 2 ounces ; iron perchloride, 50 grains ; citric acid, 40 grains.

(4) A : Gum arabic, 120 grains ; water, 1 ounce. B : Tartaric acid, 40 grains ; water, 2 drams. C : Saturated solution of iron perchloride. To prepare the sensitizing mixture, add B to A and mix thoroughly, then add 100 drops of C. This mixture is kept a few days (in the dark) and diluted with water to suit the paper employed. A thick paper will require a more dilute fluid than paper of the hard, non-absorbent kind.

(5) This is a frequently quoted mixture, but does not differ materially from No. 1. A : Gum arabic solution (1 in 5) ; ammonio-citrate solution (1 in 2) ;

iron perchloride solution (1 in 2). To make the sensitizer take 20 parts of A, add 8 parts of B, mix thoroughly and add 4 to 6 parts of C.

(6) The following will be found adapted to very heavily sized papers of hard, non-absorbent character. As it contains no gum or similar substance, the coating of the paper may be quickly and easily accomplished with a brush. Mix: Oxalic acid, 1 part; iron perchloride, 2 parts; water, 20 parts.

**Coating the Paper.** On account of the gum present (usually) in the sensitizers, papers of this class are not easy to coat. A good method is as follows: Dampen the sheet of paper on both sides with a sponge not too heavily charged with water, and lay them in a pile on top of each other. When ready to sensitize, take one sheet and press it between two sheets of lintless blotters. Then fix by the four corners to an inclined board, and apply the sensitizing solution with a broad, flat brush, as quickly as possible, working as directed for the sensitizing of negative cyanotype paper. When the sheet has been carefully covered with crosswise strokes, take a clean brush dipped in water and pressed almost dry, and go over the coating from end to end with quick, sweeping strokes. Upon the rapidity and evenness of the coating depends, in a measure, the quality of the print. As soon as sensitized suspend the sheet before a stove or glowing fire, so that it may dry quickly. All this is done, of course, in non-actinic light. When dry, roll the sensitized sheets up and keep in a tin with a well-fitting lid, where the paper may be kept in good order for some weeks.

**Printing.** This is done as in the first method described. It should be pointed out that although the process does not reverse the light and shade of the original used in printing, it necessarily reverses the right and left of the design unless the sensitive paper is placed in contact with the back of the design, and so printed through it. With thin originals, such as tracings or drawings on thin paper or linen, this does not materially affect the sharpness of the image.

The progress of printing is not easy to estimate, as the image is very faintly visible, as in platinotype printing. Usually, trial slips of the paper are printed at the same time as the larger print (under a similar design), and these are withdrawn singly and developed from time to time to show the progress of printing.

**Development.** When the print is estimated as sufficiently exposed, preparations for development are made as follows: Set out three trays of ample size, one containing water, another containing a solution of ferr*o*cyanide of potassium ("yellow prussiate"), 20 parts of the salt to 100 parts of water, and the third tray containing a dilute solution of hydrochloric or sulphuric acid, strength say 1 or 2 parts of acid in 100 parts of water. To develop the print, lay it face down on the table and turn up each edge ¼ inch. Now lay it face down on the solution of ferr*o*cyanide, so that it floats on the solution without the latter touching the back of the print, which is uppermost. Examine the print in a minute or so. The image should show blue violet lines on a yellowish-green ground. If the image is not sufficiently developed, return the print to the tray, or hold it in the hand a few moments. When development is complete, immerse in the tray containing clear water and wash thoroughly; finally transfer it to the acid bath which will clear the white portions and deepen the color of the blue lines. After this, wash well again, and the print is finished. Pizzighelli advises that, as soon as the ferr*o*cyanide has done its work, the print should be cleared with a small jet of water applied locally to all parts of the white ground. If this is overdone the blue lines will be dissolved, hence care is necessary. Lietze continues the development until the blue lines are slightly visible through the back of the print, which is then turned over, face up, on a water bath, and the bluish discoloration of the ground is removed by means of a camel's-hair brush.

If the lines of the print are clear and blue, but the ground is visibly colored, under-exposure is indicated. If the lines are pale and uneven in density of color, this shows that the light has penetrated the black lines of the drawing printed from and partly decomposed the ferric salt. In other words the print is over-exposed.

Positive "blue" prints by this method may be toned, reduced, intensified, etc., as advised in the *negative* cyanotype process, except that the use of toning formula No. 5 is not advised.

**Corrections.** These may be made by locally applying a solution made of: Caustic potash, 1 part; oxalic acid, 1 part; water, 10 parts. A five per cent. solution (23 grains of the salt to 1 ounce of water) of potassium oxalate is equally efficient. This should be applied with a quill pen or small brush, a little gum being mixed with the fluid to prevent its action spreading where not needed.

Blue prints, by positive or negative methods, may be varnished with Canada balsam or gum damar made in the form of a thin varnish with turpentine. Small prints, made in imitation of decorative tiles, may be rubbed over with encaustic paste and burnished in a print burnisher.

**Ferro-Gallic or "Black Line" Process.** This process is closely related to the Positive Cyanotype method just described, giving a direct positive—black lines on a white ground—when the sensitive paper is exposed under a drawing or positive design. It is sometimes spoken of as the *Ink Process* and *Black Line Process*, referring to the character of the image, but the name Ferro-Gallic tells us the nature of the process itself and is, therefore, preferable. The process is generally ascribed to Poitevin (1859–60), but has been much modified since that time.

Briefly outlined, paper is coated with a ferric salt associated with an acid. Where the light reaches the paper through the transparent (translucent) portions of the original design, the ferric salt is reduced to the ferrous condition. The image is developed by applying to the print a solution of gallic acid, which reacts with the unaltered ferric salt (where the opaque lines of the design have prevented decomposition by light) and produces an ink-like image. Where the ferric salt has been completely changed to the *ferrous* state, the gallic acid has little or no action. Thus, by this method, we may reproduce in facsimile, without a camera, any design in black and white, as a piece of music, etc.

Success in working the method seems to depend (1) on a certain adjustment of the developer to the sensitizing solution employed, and (2) on that facility in manipulation which comes from experience with the peculiarities of the process. To prevent confusion I give the formulæ for sensitizing and developing solution in pairs, side by side.

No. 1.

| *Sensitizer.* | |
|---|---|
| Iron persulphate (ferric sulphate) | 10 grains |
| Tartaric acid | 10 " |
| Ferric chloride | 20 " |
| Gelatine solution | 5 drams |

| *Developer.* | |
|---|---|
| Gallic acid | 4 grains |
| Alcohol | 30 drops |
| Water | 1 ounce |

The gelatine solution is first prepared by soaking 35 grains of gelatine in 1 ounce of water until quite soft, then dissolving with gentle heat. When liquid the other ingredients are added, the acid last.

No. 2.

| | *Sensitizer.* | |
|---|---|---|
| A. | Gelatine | 35 grains |
| | Water | 1 ounce |
| B. | Ferrous sulphate | 20 grains |
| | Ferric chloride | 20 " |
| | Tartaric acid | 20 " |
| | Water | 1 ounce |

| *Developer.* | |
|---|---|
| Gallic acid | 30 grains |
| Oxalic acid | 6 " |
| Water | 10 ounces |

Mix A and B separately, add together, and coat paper while warm.

No. 3.

| *Sensitizer.* | |
|---|---|
| Ferrous sulphate | 20 grains |
| Ferric chloride | 45 " |
| Tartaric acid | 40 " |
| Water | 7 drams |

| *Developer.* | |
|---|---|
| Gallic acid | 15 grains |
| Oxalic acid | 2 " |
| Water | 4 ounces |

No. 4.

| | *Sensitizer.* | |
|---|---|---|
| A. | Gelatine | 40 grains |
| | Water | 1 ounce |
| B. | Ferrous sulphate | 35 grains |
| | Ferric chloride | 75 " |
| | Tartaric acid | 30 " |
| | Water | 20 ounces |

| *Developer.* | |
|---|---|
| Gallic acid | 30 grains |
| Oxalic acid | 5 " |
| Water | 10 ounces |

Prepare A and B separately. Mix while warm and coat the paper immediately after mixing.

No. 5.

| | *Sensitizer.* | |
|---|---|---|
| A. | Gelatine | 5 grains |
| | Water | 120 minims |
| B. | Zinc sulphate | 5 grains |
| | Ferric chloride | 10 " |
| | Tartaric acid | 5 " |
| | Water | 120 minims |

| *Developer.* | |
|---|---|
| Gallic acid | 1 grain |
| Alcohol | 10 drops |
| Water | 6 drams |

No. 6.

| | *Sensitizer.* | |
|---|---|---|
| A. | Gelatine | 154 grains |
| | Water | 4 ounces |
| B. | Ferrous sulphate | 154 grains |
| | Tartaric acid | 154 " |
| | Ferric chloride | 308 " |
| | Water | 7 ounces |

| *Developer.* | |
|---|---|
| Gallic acid | 108 grains |
| Oxalic acid | 15 " |
| Water | 35 ounces |

Prepare A and B separately and mix by filtering through flannel into a bottle or bowl while still warm. Coat the paper immediately after mixing, and use as soon as dry. This is Vogel's formula and is perhaps more satisfactory than those previously given. Much depends on the choice of paper as to which of the above formulæ to use; the more absorbent sorts of paper require a sensitizer strong in gelatine. In all these formulæ we have a ferric salt with an acid as a basis. Gallic acid is the active agent in the developer, alcohol being added to facilitate its solution. The alcohol and gallic acid should therefore be mixed first, and the water added. The addition of the oxalic acid is intended to keep the high lights (or whites) of the picture free from stains.

**Exposure and Development.** The sensitive paper should be exposed until the image is visible as yellow lines on a light ground. If the ground is much colored, under-exposure is indicated; over-exposure is shown by the disappearance of the finer lines. To develop, immerse the print in the developer for three minutes, when the yellow image will gradually acquire a slaty-black color. Now wash the print in water, dry off the surplus water with lintless blotter, and dry, preferably in sunlight. The chief difficulty is to secure a clear white (untinted) ground, and this is accomplished only by perfect adjustment of the developer to the sensitizer, the exact amount of gum in the latter, and correct exposure. One or two other processes, similar to the foregoing, are included as variants. The general remarks about Positive Cyanotype and the Ferro-Gallic methods apply to these also.

**Heliographic Process.** This differs from the ferro-gallic method chiefly in the use of tannic acid in development, and a slight variation in the sensitizing solution; otherwise its manipulation is the same. To form the sensitizer prepare the following solutions: A: Ferr*ic* sulphate, 3 parts; water, 20 parts. B: Tartaric acid, 5 parts; water, 50 parts. C: Gum arabic, 5 parts; water, 50 parts. Mix A and B, then add C, stirring the mixture well. Finally add 10 parts of a saturated solution of ferric chloride. If the resulting mixture is too thick for coating the paper evenly—which depends on the character and surface texture of the paper used—it may be gradually diluted.

For the developer take: Oxalic acid, 2 parts (2 grains); tannic acid, 40 parts (40 grains); water, 2000 parts (4 ounces).

**Makahara's Process.** This is a modification of the above, as may be seen on comparing the respective formulæ. *Sensitizing solution*: A: Gum arabic, 75 grains, dissolved by gentle heat in 2 ounces of water. Add to this: Tartaric acid, 10 grains; sodium chloride, 45 grains; ferrous sulphate, 50 grains; iron perchloride, 75 grains. Mix in the order named. A highly sized paper is best adapted to this formula; the coating should be done quickly, and the sensitized paper dried before a glowing fire, in order to hasten its drying and keep the sensitizer on the surface. For development a five per cent. solution of gallic acid is advised. The strength of this developer may be modified as seems necessary. If it stains the print, reduce its strength, and *vice versa*. A final wash in very dilute oxalic acid will clear a slightly stained print, after which wash well and dry in the sun.

**Poitevin's Ink Process.** We may now profitably glance over a few dissimilar methods, resembling the foregoing only in that they make use of light-sensitive iron salts. The pigment process of Poitevin (1859–60) comes first. This method is based upon the facts (1) that ferric chloride renders gelatine insoluble and that (2) exposure to light reduces the ferric salts to the ferrous condition, whereupon the gelatine (where light-action has taken place) again becomes soluble. The application of this principle is obvious. If we coat paper with gelatine (colored with a pigment) and ferric salts, and expose it to light under a positive drawing or design, the portions of the film protected by the lines of the design will remain unchanged and insoluble. Those portions of the film which are not so protected will be changed by the exposure to the ferrous state and regain their solubility. Hence we may remove these portions by washing. Thus from a positive original we get a positive print, the color of which varies with the pigment incorporated in the gelatine film. The working details are as follows: Any hard surfaced, well-sized paper is coated with a 20 per cent. solution of gelatine (91 grains to the ounce of water) prepared in the usual way. When dry, sensitize in the following solution: Ferric chloride, 15 grains;

citric acid, 10 grains; water, 1 ounce. Float the paper on the sensitizing solution, as brushing would damage the gelatine coating. Dry quickly and expose to sunlight under a positive or transparency. The length of exposure must be learned by experience; from twelve to twenty minutes in direct sunlight may be suggested. After exposure wash the print in warm (not hot) water for a few minutes. Now prepare a creamy solution of India ink and add to it a few drops of glycerine. Brush this over the damp print, and the insoluble (unremoved) lines of the image will absorb the ink and give the image.

A more recent modification of the method consists in thoroughly mixing a solution of India ink or other inert pigment with a warm 20 per cent. solution of gelatine, and coating paper with this mixture while still warm and liquid. Hang the gelatinized paper up to dry, and prepare the sensitizing solution as follows: Iron chloride, 50 grains; tartaric acid, 15 grains; water, 1 ounce. Immerse the dried paper in this until it becomes fairly limp, and again hang up to dry. Print with an actinometer, just like a carbon print, and develop the image by washing in warm water. As the reader will have observed, these are really pigment processes.

**Ferric-Ammonio Oxalate Process.**

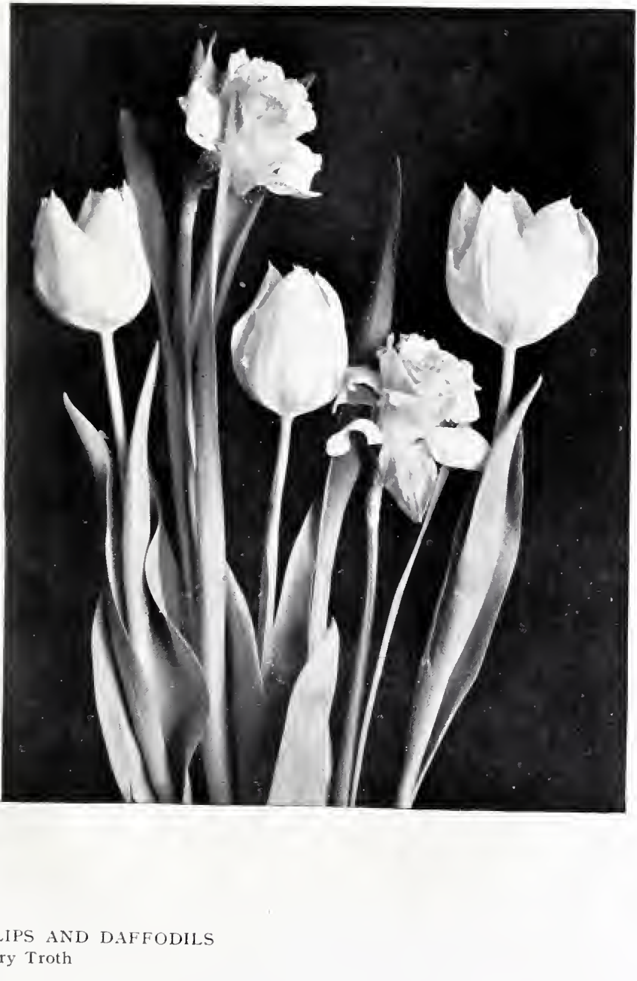
This is a variant of the familiar "blue" process, and is preferred by some. Prepare the sensitizing solution by dissolving 1 dram of ferric-ammonio oxalate in 1 ounce of water. Keep this solution from the light, as it is sensitive. Coat well-sized paper with this solution and dry quickly, just as was directed for the "blue" process. Print under a negative until a faint but distinct image is seen. Develop the print by floating on or brushing over a developer composed of a 20 per cent. solution of ferr*i*cyanide of potassium. This gives a brilliant blue image which is cleared by washing in several changes of water.

When the principles underlying the iron-printing methods were spoken of, it was pointed out that ferric salts, when reduced by light to the ferrous state, have the ability to reduce or react with other metallic salts. This property is utilized in the platinotype process where we have paper coated with ferric oxalate and a platinum salt. On exposure to light the ferric oxalate is reduced to ferrous oxalate, the platinum salt remaining unchanged. By the application to the ferrous image of a solution of potassium oxalate, the iron (ferrous) image is replaced by a platinum image, the developer causing the ferrous oxalate to react with the platinum salt, resulting in a deposit of metallic platinum. The platinum processes have already been considered in an earlier number of THE PHOTO-MINIATURE, and need not be further mentioned here. The reduction of silver salts by ferrous salts is another interesting application of Herschel's principle, and as it gives us a simple and beautiful printing method (that known as *Kallitype*), it may be dealt with in detail here.

**Kallitype Process.** This process was introduced by Dr. W. J. Nicol about ten years ago, and has since been modified to render it easier in manipulation and more certain in results. *Kallitype* paper is obtainable commercially in England; *Polychrome* and *Celerite* papers are modified American varieties. The manipulation of these papers is extremely simple; they are more rapid in printing than "blue" print papers, and give a silver image of great delicacy and beauty. This image is capable of almost all the changes, toning, intensifying, to which bromide prints are susceptible.

As at first introduced *Kallitype* consisted in coating paper with a ferric compound, exposing to light in the usual way, and developing the ferrous image by means of a solution containing silver nitrate and a soluble salt of an alkali metal or ammonium—such, for example, as potassium oxalate—and ammonia. The prints were then washed in a solution of soluble citrate or ammonia. This process, however, has, we believe, been abandoned in favor of that called *Kallitype No.* 2. In this a mixture of ferric oxalate and silver nitrate is applied to the paper, and the picture is developed in a bath containing Rochelle salt and borax, the washing solution consisting of ammonia and water. It will thus be perceived that in the second process the silver is applied direct to the paper before exposure, instead of, as in the older method, being made a constituent of the developing bath.

I quote a clear account of the later method given by C. E. Brown in the *Amateur Photographer:* The preparation of the paper is simplicity itself, and the sensi-



TULIPS AND DAFFODILS
Henry Troth

By G. W. Pach

tizing solution can be applied to all sorts and conditions of supports, with the necessary qualification that no metallic particles or other mineral impurities, such as ultramarine, are present to give rise to the reduction of silver salt. Then, by a simple modification of the developer—the alteration of its content of potassium bichromate—strong prints can be obtained from weak and fogged negatives. The materials are extremely cheap, and the range of colors fairly great; at any rate, prints in cold engraving black through warm black to sepia can be obtained. So much by way of introduction. Let us now to matters practical.

**Sensitizing Solution.** A standard formula for the sensitizing solution, and one which has given me every satisfaction, is as follows: Ferric oxalate, 75 grains; silver nitrate, 30 grains; distilled water to make 1 ounce.

In making up this solution, the only uncertain ingredient is the ferric oxalate. It can be bought, either in solution or in the solid state, from a large firm of chemical dealers such as Chas. Cooper & Co. The former is the most convenient, and where a 20 per cent. solution is used 400 minims should be measured out for the above formula, and the liquid made up to 1 ounce.

If the solid is used, proceed as follows: Place the oxalate in a stoppered bottle, add the water, and place in a saucepan of water. Gradually raise the water to nearly boiling, and shake till ferrous oxalate dissolves. Filter if not clear, and when cool add the silver nitrate. These operations should be performed in a dull light, such as is used for toning. The solution keeps indefinitely.

**Coating the Paper.** The paper is first cut to size, say to sheets twice the size of whole plate—certainly not less than whole plate—and a number of them pinned down to a board half an inch or so smaller all the way round than the paper. A little of the sensitizing solution is poured into a dish or saucer, a fine sponge saturated with it, and squeezed fairly dry. By giving broad strokes across the paper, afterward crossing these, it is easy to produce a coating very uniform and free from streaks. If very rough paper is being sensitized, use the sponge rather wetter, and mop the liquid well into the depressions of the paper. Drying is done very easily at a few feet from a clear fire, holding the sheet by the corners, or pinning it to a clean board. Gas or lamp light will not, in a reasonable time, affect the paper.

**Exposure.** The time of exposure is rather shorter than with printing-out paper. The image appears faintly as bluish brown on a yellow ground. It is best to back the paper during the printing with oilcloth or celluloid sheet, as damp makes it difficult to judge when exposure is complete. Under normal conditions the detail in the densest portions of the negative should just be visible. Thin negatives require from 40 to 60 seconds; dense negatives from 2 to 5 minutes.

**Development.** A mixture of Rochelle salt and borax is the simplest; the more Rochelle salt, the warmer the color. Formula A is for black tones, B for purple, C for sepia: A: Borax, 45 grains; Rochelle salt, 30 grains; water, 1 ounce; potassium bichromate (1 per cent. solution), 45 minims. B: Borax, 45 grains; Rochelle salt, 10 grains; water, 1 ounce; potassium bichromate (1 per cent. solution), 45 minims. C: Rochelle salt, 25 grains; water, 1 ounce; potassium bichromate (1 per cent. solution), 25 minims.

For flat and weak negatives and over-exposed prints increase the bichromate solution. Immerse the prints face up in the developer, and smooth away any air-bubbles with a glass rod. Within a second or two the faintly visible image develops up to a vigorous print. The print must, however, be allowed to remain at least fifteen minutes (or better, half an hour) in the developer, which, besides "developing" the image, plays another *rôle*. This is to render the iron in the paper thoroughly soluble, and unprecipitable by ammonia. If this is not properly done, yellow stains and impermanent prints are the result, and, as the developer costs very little, it is a mistake to overwork it.

*Engraving black tones* can be obtained by using a strong solution of sodium acetate as a developer. Take sodium acetate, 70 grains; water, 1 ounce. As soon as the image has attained its full depth in this, transfer to a strong solution of potassium oxalate: potassium oxalate, 80 grains; water, 1 ounce;—afterward fixing in ammonia solution as given below.

A bath which has been recommended to give maroon tones is: Rochelle salt, 45 grains; sodium tungstate, 20 grains; water, 1 ounce;—but I have not myself used it.

**Fixing.** From the borax bath the prints go to the so-called "fixing" bath, a weak solution of ammonia: Stronger ammonia water, 7 minims; water, 1 ounce.

They remain here ten minutes, being turned over at intervals, and then go to a second similar bath for the same time; after which they are washed in running water for a quarter of an hour, and dried.

Those who wish to experiment will find *Kallitype* an extremely interesting and promising field. The color of the deposit is different with different salts, and by using such salts as formates, meconates, etc., followed, if necessary, by a second bath of borax, there is a wide field for obtaining a variety of colors. Then by adding an oxalate to the sensitizing solution a paper is obtained which prints out in the frame. This, indeed, is part of the patent-specification wherein the following formula is given: Ferric oxalate, 150 grammes; potassium oxalate, 30 grammes; silver nitrate, 30 grammes; water, 1000 cubic centimetres.

Prints made by this formula only require, after exposure, to be fixed in: Sodium citrate, 30 grammes; citric acid, 5 grammes; water, 1000 cubic centimetres.

In using the ready prepared papers *Polychrome*, etc., the instructions enclosed with the variety of paper used are, of course, to be followed.

**Ferric Citro-Oxalate Process.** This is a somewhat similar method to the above. Prepare the following sensitizer: A: Ferric citrate, 50 grains; ferric oxalate, 25 grains; water (distilled), 1 ounce. B: Silver nitrate, 25 grains; water (distilled), 1 ounce. Mix A and B; shake and allow any precipitate to settle, and filter off the clear liquid to form the sensitizing solution. Well-sized paper is coated, with sponge or tuft of absorbent cotton fixed in the neck of a bottle, dried quickly, and exposed under a negative to sunlight. The image prints out fully, and after being washed in clear water, the print is fixed in a dilute solution of ammonia, say 2 per cent. of ammonia to the ounce of water.

**Ferro-Cupric Process.** About 1865, Obernetter published a method combining the use of salts of iron and copper, giving red or purple black prints. The subjoined formulæ are sufficient to enable the reader to give it a trial. Prepare a solution composed of: Copper chloride, 50 grains; water, 1 ounce; hydrochloric acid, 10 minims; ferric chloride solution (sp. gr. 1.5), 10 minims. This forms the sensitizing solution. Well-sized paper is floated on the solution for three minutes, quickly dried, and exposed to daylight under a negative until the image is faintly visible. Protect the paper from damp during printing. The developer is made up as follows: Potassium sulpho-cyanide, 10 grains; sulphuric acid, 2 minims; water, 2 ounces. To this add 15 to 20 minims of the sensitizing solution. The exposed print is developed by floating on the above; when the image is well developed out, but not before, the print may be completely immersed. After development the print is finished by washing in clear water, or it may be toned. For *red tones* bathe the developed print, after washing, in a 10 per cent. solution of potassium ferricyanide. For *purple* to *black* tones use a bath composed of: Ferric chloride, 10 grains; water, ½ ounce; hydrochloric acid, 20 minims; ferrous sulphate, 25 grains. In this bath the print changes from red-violet to blue-black and black. A final wash in acidulated water completes the print.

**Ferric-Uranic Processes.**

Several methods have been published from time to time combining salts of iron and uranium for printing purposes. Two such methods are given as of interest to the student. *First method* (as given by Wall): Prepare a solution of uranium nitrate, 25 grains, in water, 1 ounce. Float a sheet of well-sized paper on this for half a minute and dry quickly. Exposed to light under a negative a dark brown image is seen on a yellow ground, and this image may be developed so as to give different colored prints. Printing is slow—average negative in sunlight 30 minutes to one hour. After exposure wash the print in clear water for a few seconds and then float it on a 2 per cent. solution of potassium ferricyanide. This gives a deep red tone. Green tones are obtained by floating the exposed print, after washing, in a 5 per cent. solution of cobalt nitrate; after the desired tone is obtained, immerse the print for a few seconds in the following solution: Sulphate of iron, 20 grains; sulphuric acid, 16 drops; water, 1 ounce. Then wash well and dry. If the exposed print is washed, and given a coating of gold chloride solution (2 grains to the ounce of water), a violet image results.

Instead of the sensitizing solution above given, we may coat the paper with : Uranium nitrate, 90 grains; copper nitrate, 30 grains ; water, 1 ounce. Dry quickly, expose under a negative as usual, wash, and tone by brushing over the print a solution of platinum perchloride (2 grains to the ounce of water) which gives black tones.

Fisch's process, which should perhaps have been given first in this class, is as follows : Prepare the sensitizing solution—A : Gum arabic, 300 grains ; water, 2 ounces. B : Tartaric acid, 75 grains ; water, 5 drams. C : Iron persulphate, 35 grains ; water, 3 drams. D : Uranium nitrate, 6 grains ; water, 3 drams. Add B to A, then add C, and D, and finally add 3½ drams of a saturated solution of iron perchloride. Well-sized paper is quickly and evenly coated with the above mixture, dried before a fire or stove and stored away from light. When exposed under a positive to sunlight a visible image is obtained. The paper first turns yellow-gray, and then white. The exposure should rarely be longer than twelve minutes. The print so obtained is developed as follows : Lay the print down on a slab of stout glass or marble support. A gelatine roller (obtainable from engravers' supply stores) is charged with black printers' ink, and this is passed to and fro over the surface of the print so as to give it a thin, even coating of ink. Excessive inking is to be avoided. The roller is now laid aside, and a flat, broad brush is passed over the print in all directions until the surface is obscured by a semi-transparent brown-black coating. The bottom of a tray is now wetted and the print laid in so that it adheres and will not slip about. The tray is now put under a rose spray of water and well sprayed, being at the same time lightly sponged all over. The result of this treatment, if exposure and manipulations are correctly managed, should be a positive in strong black lines on a white ground. A tinted ground indicates insufficient exposure. By taking the print into daylight, while still wet, and giving it a further exposure, this defect may be partially remedied, after which the washing should be resumed. Obviously other colored inks than black can be utilized in this method for obtaining positives in various colors.

Here our excursions among the iron-printing processes fitly ends. There are many other methods based upon the principles herein dealt with, innumerable modifications, and unnumbered variations of formulæ. In my choice of those given I have taken such as seemed practical and fairly simple in manipulation, or such as are recommended by authorities. In his experiments with these processes, as I said before, the reader will often differ, as to results, with what has been here set down. With many of the methods this is, apparently, unavoidable from the nature of the materials employed. But, to those who care to spend an hour or two now and again in experimenting, the iron-printing methods are rich in interest, and will well repay in useful knowledge the time devoted to them. For the amateur the first process described (ferro-prussiate) and the *Kallitype* methods are perhaps the simplest and most satisfactory. The others appeal more strongly to the advanced worker, or those interested in obtaining positive prints direct from a positive original.

Acknowledgment is here made of the substantial help given in the preparation of this number by F. C. Lambert, to whom I am indebted especially for many of the formulæ. Those who desire to follow the methods here described more fully will find them in the following books, from which much of my information has been drawn :

## BOOKS.

*Modern Heliographic Processes*. By E. Lietze. 1888. 142 pp. with specimens of the processes described. $3.00. (Now out of print, but available at the libraries.)

*Photographic Reproduction Processes*. By P. C. Duchochois. 122 pp. 1891. Paper, $1.00.

*Ferric and Heliographic Processes*. By G. E. Brown. With six specimen heliographic prints. $1.00.

(This book, just announced by Dawbarn & Ward, Ltd., London, will, I believe, prove perhaps the most useful work on the subject. It deals very completely and practically with the various methods, and has been prepared by a worker well fitted for the task.)

*The Chemistry of Photography*. By W. J. Harrison. 1892. $3.00.

*The Chemical Effect of the Spectrum*. By Dr. J. M. Eder. (American Edition, 1884.) 88 pp. 50 cents.

(These last two contain chapters devoted to the chemistry of the iron salts.)

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# NOTES

By the time this reaches our readers the February number of THE PHOTO-MINIATURE, dealing with *Developers and Development*, will be in press. Hence we hope to deliver that number within twenty days of the publication of this. Despite the continued delay in publication, the success of the magazine grows in a very gratifying way. Thus we are printing a third edition of the first number, dealing with *Modern Lenses;* the reprint of the fourth number, *Photography Outdoors*, will be ready for delivery in a few days; and Nos. 6 and 7 will have to be reprinted at an early date. The second edition of No. 2 is also about exhausted, and a third edition of that will apparently be required within a month or two. The first edition of the February issue, No. 11, will be 5,000 copies in order to obviate the necessity of reprinting within the first month or two after publication.

◆

We have made several attempts to secure such outside help as will enable us to publish the magazine more promptly, but without complete success. These efforts are being renewed, and we hope to achieve the desirable end before very long. Meanwhile we must ask readers to continue their good-will in patience.

◆

At a recent meeting of the Royal Photographic Society, Mr. J. G. Hudson exhibited an enlarging lantern in which no condenser is used, the immediate source of the light passing through the negative being a sheet of opal glass placed about 4½ ins. behind the negative, this sheet of opal glass being illuminated by small incandescent electric lamps, so placed near the margin of the opal glass reflector that the direct radiations from the lamps are unable to pass through the negative to the lens. In the special apparatus shown, six small lamps (six-volt) were ranged in two rows of

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three each, and near to the margin of a sheet of opal large enough to give a clear illuminated area sufficient for a half-plate negative. It need scarcely be said that the illumination thus obtained, by reflection from the opal glass, is more even than when a condenser is used in the ordinary way, and the time of exposure is by no means inconveniently long, even when the degree of enlargement is considerable.

❧

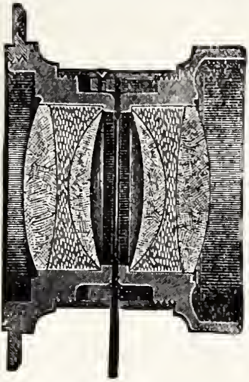
A capital idea is embodied by Mr. F. Dundas Todd in the last issue of his journal, *The Photo Beacon*. This is the setting apart of a certain amount of space in the magazine to the discussion and description of *Home Hobbies* of an intellectual kind. The new department must be seen to be appreciated. Other good things in this number (February) are the illustrated papers on "Artistic Landscape Photography," by John A. Hodges; "How to Build a Studio (for amateurs);" "Interiors," and "Photographing Flowers by Welsbach Light."

❧

A very handy device for quickly and correctly estimating exposures is supplied in the *Exposure Disk* just introduced by Chester W. Brown, of Jackson, Mich. This consists of a series of three discs of celluloid, fastened so as to revolve easily upon each other, each disc corresponding to one of three tables which form part of the complete disc. The operations necessary to find the exposure under any given conditions are (1) find the figure representing the light value at the time of testing, (2) set "F"—middle disc, opposing the sunlight number on outer disc, (3) set U. S. 4—on inner disc opposite the letter for subject and light on middle disc, (4) turn the inner disc to right the number of spaces indicated in the table for plate used. The figures opposite the stop numbers indicate the exposure required with any stop. We have tested the *Disk* and find it much simpler in operation than the description given would imply. It is reliable in its figures, and should prove popular with amateur photographers.

❧

In negative-making much of one's success depends upon securing harmonious relation between the plate



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and developer used. During recent experiments, in which it was necessary to get the maximum amount of detail and gradation of which our plate was capable, we used Wenzel's *ortol-metol* developer with *Lovell's* extra-rapid plate with a great deal of satisfaction. The negatives obtained had not only good density and printing color, but an unusually full range of gradation, with considerable detail in the highest lights as well as in the shadows—despite unfavorable conditions of illumination.

❧

The editor of *Photography* (London), Mr. R. Child Bayley, is publishing in that paper a series of interesting elementary chapters on "Photography in Colors." The chapter given in the last number received deals with "Three-Color Lantern Slides," according to the method recently worked out by Mr. Sanger Shepherd.

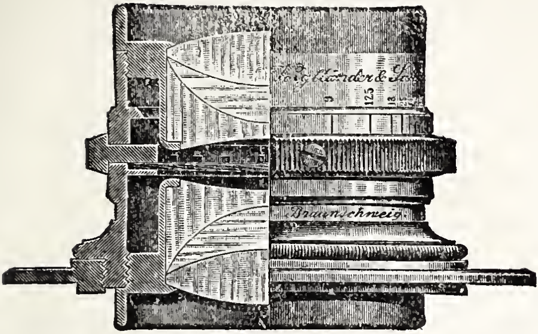
❧

The new president of the Royal Photographic Society of Great Britain is Mr. Thomas R. Dallmeyer, who succeeds the Earl of Crawford. Mr. Dallmeyer is admirably fitted to uphold the best traditions of the "parent society" and, at the same time, infuse new life into its general management.

The latest number of the *Journal* of the society received is, by the way, more than usually interesting. It contains papers on the "Origination of Printing Types by Photographic Methods," by Thomas Bolas; on "Screens for Three-Color Work," illustrated, by Sir W. de W. Abney; and on "Toning Bromide Prints and Lantern Slides with Copper Compounds," by W. B. Ferguson. The Progress medal of the society has been awarded to M. Louis Ducos du Hauron, "for having initiated three-color heliochromy as a working process." Professor Thomas W. Smillie, of the Smithsonian Institution, Washington, has recently been admitted to the Fellowship of the society.

❧

An English photographer recently made a print of very good quality, save for a slight stain at the edges, on bromide paper thirteen years old. This is probably the record as far as the "keeping quality" of bromide paper is concerned.



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The subjoined extract from a recent address by Mr. Craig Annan, of Glasgow, is to our mind a fairly satisfactory answer to a question which is often asked by photographers:—How can I acquire that feeling or perception of the beautiful which will help me to secure pictorial quality in my work with the camera? After depreciating, "as useless, argument about the peculiar qualities which constitute a work of art," Mr. Annan acknowledged most readily "the great benefit to be derived from a sympathetic exchange of ideas. Practically no man is strong enough to isolate himself entirely; to develop his mind to its fullest capacity, he must have the benefit of his neighbor's experience; but such intercourse, to be of real assistance, must rest upon a strong basis of agreement. If the ideas of two persons are fundamentally different, a discussion between them is worse than useless. Art is purely a sentiment, and it is impossible to give logical reasons, why one thing should be right and another wrong. Certain laws have been discovered which seem to govern composition and design, but these are the outcome of experience, not reason. Besides, it is absurd to be dogmatic." [Will the Maryland friend who desired us to prepare a number of THE PHOTO-MINIATURE dealing with *Art in Photography*, please note the above?—Ed. P.-M.] Mr. Annan then goes on to say:

"But granted a certain basis of sympathy, the discussion of any art work is of the greatest possible value. It raises enthusiasm and that healthy form of excitement which stimulates the mind, and enables one to produce the highest form of work of which one is physically capable. I have personally experienced this very strongly; it has been when I have associated closely for a period with artists of power that I have made my most successful pictures; and, on the other hand, when I have, for instance, spent a holiday with others who may have distinguished themselves equally in their particular professions, but had little intimate knowledge of art, I have found the contents of my camera to be sadly lacking in that subtle something which makes one photograph so very much more interesting than another. And in my experience, this contagious enthusiasm does not spread readily from a platform nor from a printed page. It is in the casual conversation of friendships that it is most active, though probably imperceptible.

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It is not sufficient, however, to rely upon our acquaintances alone for our stimulus, we must study the work of the great art masters. But this, again, is useless advice to give to anyone who has outgrown his boyhood, because if we have the germ of art instinct within us, we will do so without such advice ; and if we have not, no amount of advice will compel us to do what is a physical impossibility. We may, from a sense of duty, visit art galleries, and derive very considerable pleasure from a study of the subjects and sentiment of the pictures, even the drawing and likeness to nature may attract us, but we will be unable to appreciate the subtle qualities of spacing and arrangement of light and shadow, or of sweetly curving and rigidly severe line, and all the other elements which go to the making of a fine work of art. Still, the germ of art instinct requires cultivation, and there is no doubt that the more assiduous the cultivation, the greater will be the development.

" And to develop our minds by the study of great pictures, it is not sufficient that we should make a point of visiting picture galleries whenever occasion offers, or that we should provide ourselves with a collection of reproductions which we may store in a cupboard, and only refer to occasionally. We must have them upon our walls, where we can see them at all times, that we may absorb their influence as unconsciously as the air we breathe, in short we must endeavor to surround ourselves in the rooms in which we chiefly live with the most beautiful objects which we can procure, and, what is equally important, we must exclude everything from our immediate surroundings which is antagonistic to beauty, if we are to place ourselves in the most favorable position to do artistic work.

" It may seem ridiculous to many to suggest that the unconscious sight of a beautiful curve of a chair at breakfast may enable one, later in the day, to produce a photograph of value which he otherwise would not have produced : but I am perfectly convinced that such is the fact. I do not consider beautiful surroundings a luxury, but an absolute necessity to the successful cultivation of an artistic spirit.

" By accustoming one's self constantly to see things of beauty, one becomes more sensitive and more able to discriminate rapidly as to what is really fine and what is not, and it is this power of rapid discrimination which

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is the most useful attribute a photographer can possess. His subject, unless it be one of still life, is constantly varying, and he must be capable of instantly deciding when it has assumed such an arrangement as most nearly realizes his ideal. And the effect of beautiful surroundings is not only to quicken the artistic perception, but it is a constant incentive to the creation of new and finer ideas, and consequently to the production of more personal and original work.

"It may seem strange to suggest that the intimate study of other work should tend to make our own more original, yet if we thoroughly digest what we have observed, the result will be as I have stated. The effect of seeing anything of character and power is to excite our intelligence, and to enable us more fully to exercise our latent capacity. We may as well expect a bird to sing in the dark, or a criminal to reform in a blank dungeon, as expect to evolve brilliant conceptions, if we are content to live in an environment in which there is nothing to excite our imagination or æsthetic faculties."

❧

The New Series Rapid Symmetric Anastigmat announced by Ross, Ltd., makes available a lens for which there has been considerable demand for a year or two past, *i.e.*, a lens for general outdoor work, with the peculiar qualities of the anastigmatic type, at a reasonable price. The Symmetric Anastigmat here noticed is corrected for the popular aperture *f*/8, but the smaller sizes may be used at an aperture practically *f*/6.5—a very desirable speed for certain kinds of work. The shorter foci instruments of the series are well adapted for hand cameras and for use with between the lens shutters. The single combinations may be used as single lenses for work requiring lenses of long focus, and when so used give results comparing very favorably with what one obtains with the fine modern single lens which, of course, can only be purchased at a much higher price.

❧

A subscriber protests against the suggestion, made on page 429 of the November issue of this magazine, that "negatives reduced with ammonium persulphate should invariably be returned to the hypo-soda fixing bath before the final washing." In his experience the

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hypo-bath totally obliterated the image on the plate. We will give the suggestion a practical test. It was given—as a suggestion—from a German exchange. Meanwhile it may be noted that a writer in the *American Journal of Photography* repeats the suggestion, apparently from personal experience.

◆

*Instructions for Platinotype Printing.* Willis & Clements, Philadelphia, send us a copy of the new edition of this popular little guide to the proper use of their platinotype papers, and other specialties. Compared with earlier issues, this edition is much enlarged and improved, offering many useful hints and instructive illustrations calculated to help the novice in platinotypy. We believe that the booklet is intended for free distribution, but a mention of THE PHOTO-MINIATURE when writing Messrs. Willis & Clements will certainly secure a copy. It is worth asking for.

◆

The Harvard Camera Club (Cambridge, Mass.) held an interesting exhibition of members' work at Brooks House during February. More than a hundred prints were shown, and the judges were Professor Charles Eliot Norton, F. Holland Day, and J. Prince Loud. Judging the exhibits by the prize-pictures engraved in the exhibition catalogue, we commend the suggestion made by Mr. Carruth, of the Cambridge Photographic Club, in his criticism of the exhibition, to the effect that the club's greatest need is a better knowledge of composition and the art of trimming a print.

The club, under the presidency of Mr. Walter B. Swift, has made good progress during the year, and has now thirty-five members. The winter season's programme includes several lectures upon profitable subjects by able men. The construction and equipment of a studio is now being considered, and a hundred dollars has already been raised for this purpose by subscription.

◆

Herr Kessler gives, in *Photographische Correspondenz*, an interesting account of a method of overcoming the difficulties arising in interior photography owing to the

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impossibility of getting sufficiently far back from the object to be photographed. The method consists chiefly in the skilful use of a mirror. For ordinary subjects the mirror is hung vertically in such a position as to reflect the desired view, which is then photographed in the mirror, taking care, of course, that the camera is sufficiently inclined to the mirror to prevent its reflection being included in the picture. A toilet mirror of good quality, 2 ft. × 3 ft. 3 ins., answers excellently for ordinary purposes, but a larger mirror must be used if a very wide angle of view is required. Double image, as a rule, is not troublesome, but it is advisable to have the mirror glass as thin as possible. In special cases one silvered on the surface may be necessary. The disadvantages are: (1) Some little loss of light, necessitating an exposure one-quarter to one-third longer than if *the same view* were taken direct; (2) the image is reversed, necessitating the use of films that can be printed from either side, unless they are to be printed by single transfer, carbon, or other processes in which a reversed negative is required. The advantages are great. The mirror can be placed close against a wall, or much farther back than it would be possible to place a camera. Further, the amount of subject that can be included is the same as if the camera were placed at a distance equal to the distance of the subject from the mirror *added to* the distance of the camera from the mirror, and it is obvious that if necessary this might be nearly double the actual length of the room. It follows that, unless a very wide angle is desired, a longer focus lens can be used, which has the double advantage of giving less exaggerated perspective, and not requiring so much stopping down. There seems to be a good deal to be said for this method of working. The fear of double image is to a great extent groundless.

◆

Writing to the *British Journal of Photography*, J. Harmanus Fisher, of Baltimore, suggests the use of ammonium persulphate for removing pyro stains. He says: "A large proportion of your readers adhere to pyro, the good old developer which I prefer, but, like myself, object seriously to resultant staining of the hands. For the benefit of such I beg leave to state personal ex-

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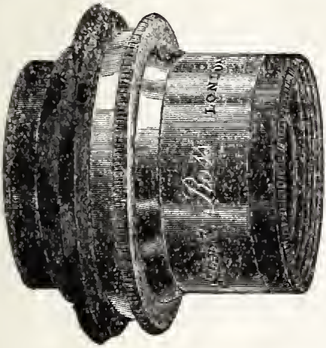

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perience. I do not claim a discovery. Some months ago I saw, in one of the journals, the suggestion of the use of ammonium bisulphate made into a paste with water. Obtaining one ounce from a prominent manufacturing chemist (who was unable to state whether or not it was applicable to the purpose, or as to its stability in solution) I dissolved it in six ounces of distilled water. Since, my custom has been, when having completed development and put the dark-room in order, to thoroughly wet the hands, pour a thimbleful, or less, of the solution in the palm of the left hand, put the fingers of the right hand into it and work down the fingers of both hands. With me the result has been most satisfactory, the stains proving rapidly fugitive. The quantity used is so small, that at three months from the date of preparation of the solution the bottle is not exhausted, and that it remains effective is a guarantee of its stability. I should add that I have not tested its efficiency for stains of more than a few hours' duration, nor for those which have been exposed to daylight."

◆

The work of preparation for the forthcoming Photographic Salon, to be held at Chicago in April next, is now well pushed forward, and a satisfactory exhibition is assured. The co-operation of all interested in pictorial photography is invited. Particulars may be obtained from the secretary, F. W. Lawrence, 65 State Street, Chicago.

◆

The annual meeting of the Photographers' Copyright League of America was held at the Falk Studio, Waldorf-Astoria, this city, a few weeks ago. An informal report of the League's work during the past year, given by Mr. Falk in the absence of President S. L. Stein, showed the condition of copyright affairs to be fairly satisfactory. Among other interesting topics discussed, the desirability of securing the support of amateur, as well as professional, photographers for the work of the league was referred to by several of the members present. The league is the only American society organized for the protection of the rights amateur and professional photographers have in the work they produce, and we would urge our readers to give it their personal

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adhesion and support. The demand for pictorial photographs increases year by year, and those who make such pictures should reserve their right to control the reproduction of their work. This is best done by an appreciation of the protection offered by the law of copyrights. Membership in the Copyright League is open to all interested, without fee or charge. All that is necessary is to send your name and address, with request for enrolment, to Secretary Charles E. Bolles, 244 Fulton Street, Brooklyn, N. Y. The editor of this magazine will be glad, at any time, to give information desired concerning the league, or in the matter of copyright.

◆

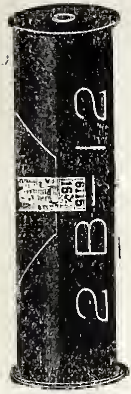
The April number of *Wilson's Photographic Magazine* will contain an illustrated description of the new studio of Mr. B. J. Falk, in the Waldorf-Astoria Hotel, of this city. In the details of completeness of equipment and elegance of its appointments, this studio surpasses any other professional studio in this country, hence "*Wilson's*" for March should be seen by those interested.

◆

Nos. 3 and 4 of the series of little books on the *Useful Arts and Handicrafts* are now ready. No. 3 deals with "Wood Carving for Beginners," No. 4 treats of "Gouge Work and Indented Woodwork." Like the earlier numbers of the series, these monographs are plainly and simply written, and offer many illustrations, both of tools and working designs. Price 25 cents each. Chicago: The Photo Beacon Co.; New York: Tennant and Ward.

◆

A correspondent calls our attention to *S & M Flash Powder*, sold in the West, we believe, by Messrs. E. & H. T. Anthony & Co., as an article deserving of mention in these pages. The promised "small quantity" has not come to hand, hence we cannot report our experience with it. Our correspondent avers that the powder excels some others in rapidity of combustion, and in the small volume of smoke following the flash. He adds that it enjoys a large sale among Western photographers.



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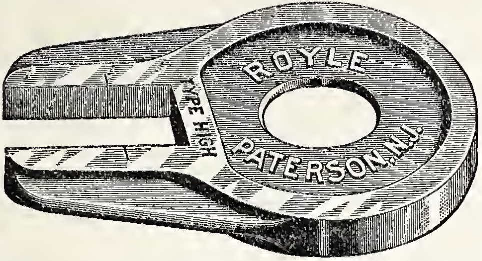

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Vol. I. No. 11. February 1900

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Vol. I FEBRUARY, 1900 No. 11

# DEVELOPERS AND DEVELOPMENT.

In an earlier number of THE PHOTO-MINIATURE it was plainly set forth that the real end intended in all photography is the print—the positive record of the thing photographed, and that the negative, properly considered, is but a means to that end. We are now about to take up negative-making, and the reader is again urged to accept this common-sense point of view. There is a tendency, almost wholly confined to amateurs, to attach too great importance to the negative simply as a negative, and to regard negative-making as the chief aim and purpose in photography. The professional photographer is free from this mistaken notion. His daily experience teaches him that the negative is merely a step toward the print, and that what he must strive for in its making is a negative which will yield desirable prints with the printing process he uses. Another popular fallacy concerning negative-making is that a good negative is one which will give satisfactory prints with any printing process. The intelligent photographer knows, however, or should know, that every printing paper represents the scale of tones from light to dark in its own peculiar way, and that, as a consequence of this, the negative should be made for the printing process he proposes to use. Let us therefore realize, in the beginning, that the negative is chiefly important as a means of producing prints; and that a good negative is not necessarily one good to look at, or admirable for the perfection of its technical qualities, but one which will give good prints by the printing process pre-determined as best suited to the interpretation of the subject.

The foundation of the negative is the sensitive plate or film on which it is made. This, as we know, is a thin film of light-sensitive bromide of silver embedded in gelatine, and coated on a piece of glass, celluloid, or hardened gelatine as a support. In the making of a photographic negative there are two essential processes, viz., the exposure of the sensitive plate or film in the camera, and the development of the image so obtained. Whether exposure, as a part of negative-making, can be interestingly dealt with in THE PHOTO-MINIATURE, or whether it must be left to the makers of exposure tables, meters, and other systems for calculating exposures, is a question yet to be decided. About development—the turning of the exposed plate into a negative—no such question arises. It is interesting, not only as a process, but also as a subject peculiarly adapted for profitable discussion in these pages. The purpose of this little book, then, is to give the reader a practical understanding of development as a part of negative-making, and of the agents or developers used in the process.

**Images.** When we set up a camera and focus the lens upon an object, we get on the ground-glass, or focusing screen, an image of the object before the lens. The ground-glass has nothing whatever to do with the formation of this image. It is, as we read in the first number of THE PHOTO-MINIATURE, the work of light and the lens. The lens collects the rays of light proceeding in all directions from every point of the object, and reforms them into an image of the object. This image is projected in the air behind the lens, at a point known as the focus of the lens. If we put a piece of ground-glass at this point of focus (the place usually occupied by the ground-glass in the camera), we are enabled to see this image, so that we may observe what amount of the subject is included by the lens, its proportions compared with the original, and the luminosity or brightness of the image, as well as the definition with which the subject is rendered. By carefully examining the image on the ground-glass we see that it faithfully reproduces all the varying intensities of light and shadow observed in the subject itself. If now we put a sensitive plate or film (the ordinary dry plate or film of the stores) in the place occupied by the ground-glass, the image falls upon the sensitive plate, and the various intensities of light in the picture image begin at once to work a change in the composition of the bromide of silver film. This change is wholly the result of light action. It varies in extent in different parts of the film according to the different intensities or brightness of light in this or that portion of the image, and also according to the duration of the exposure, or length of time during which light is permitted to reach the plate through the lens. The result of this light action is that we obtain on the sensitive film an image of the object photographed.

**Developing the Latent Image.**

This image is invisible to the eye; even with a microscope we cannot detect any difference between an exposed and an unexposed plate. That the exposed plate bears an image can, however, be proved by immersing the two plates together in certain chemical solutions, by which the image impressed by light action upon the exposed plate may be made to appear, whereas the unexposed plate will yield no image. As the image gradually appears on the exposed plate under this treatment, we see that it is apparently built up of varying degrees of blackness, corresponding in depth of color to the varying intensities of light at different portions of the object photographed. Where the object showed intense brightness, the image on the plate represents this intensity by a heavy deposit or stain of color; medium intensities of brightness in the subject are shown on the film as patches of gray color; and those portions of the object which lack brightness, such as shadows or darks, are represented by patches of unchanged film. This tells us that the action of light on the sensitive film has been proportionate to the brightness of the subject (or of the image formed by the lens) at every point. The invisible image on the exposed film, which results from exposure, is known as the *latent image;* the process by which it is made to appear, or made visible, is known as *development;* and the chemical agents used to reveal the latent image and make it visible are called *developers*.

**The Developable Image.**

The nature of the latent image has so far eluded all investigation; nor have we precise knowledge of the nature of the change effected by light in the gelatine bromide of silver film. Fortunately this knowledge is not essential to the making of negatives. We do know that this change results in such an alteration or modification of the sensitive film that we get a developable image; and that when treated with a chemical agent called a developer, the modified portions of the film are further changed (or reduced) to opaque metallic silver, forming the negative image, while those parts of the film not affected by light are not so changed or reduced by the developer. We also know that this light action is bounded by two limits, *i.e.*, that a certain amount of light action (exposure) is necessary to make an impression on the film capable of giving a developable image; and that there is a maximum exposure (or amount of light action) which, if exceeded, produces the phenomenon known as "reversal," so that we get a positive instead of a negative image. Somewhere between these two extremes is the normal or correct exposure which, upon normal development, yields a negative image correctly representing the intensities of light and shade in the subject. The determination of this normal exposure required by a sensitive plate under constantly changing conditions constitutes the problem of "exposure." How far the negative image, by its varying degrees of blackness or opacity, correctly represents the different intensities of light and shadow in the subject, depends upon the length of exposure and the method of development, and not, as many suppose, upon the chemical agent used to develop the image. When the latent image given by exposure has been developed, the unchanged or unreduced bromide of silver is dissolved and removed from the film by the application of other chemical solutions which "clear" or "fix" the image, followed by copious washing with water. In this way we get the "negative"—a reversed image, of black metallic silver embedded in gelatine, representing more or less correctly the different intensities of light and shadow in the subject by varying (proportionate) degrees of opacity or "density."

**Developers.**

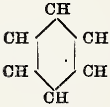
Let us now glance at the chemical agents, or developers, used to convert the latent image into a "negative." It is obvious that, as the process of development consists essentially in the changing or reduction of modified silver bromide to metallic silver, the principal constituent of the developer must be a substance capable of effecting this reduction of the silver salt. The number of substances available for this purpose has been largely increased of late years. Some of these possess, of themselves, the required power to reduce the developable image, and are known as *actual developers*. The majority of the substances used as developers, however, require the addition of an alkali (or, in some cases, of a sulphite alone) to make them energetic enough for practical use. Such substances are known as *potential developers*. Ferrous oxalate may be mentioned as belonging to the first class; pyrogallol, hydroquinone and ortol are examples of the second class. There are at least sixteen distinct developing agents in use to-day, not including ferrous oxalate (now practically discarded in negative-making) and apart from the much greater number of special preparations, mixtures and patented developers. These sixteen, naming them in the most convenient order, are : pyrogallol, usually called "pyro" or pyrogallic acid; catechol, or pyrocatechin, of which "Kachin" is a slightly modified form well known in the English market; quinol, usually called hydroquinone, hydrochinone, or hydrokinon; eikonogen; metol; paramidophenol, of which "Rodinal" is the commercial form; amidol; glycin; ortol; diphenal; diogen; diamido-resorcin; imogen; hydramine; metacarbol; and tolidol. These three last named (and possibly "pyro") are manufactured in America; diamido-resorcin, I believe, comes to us from France; and all the rest are "made in Germany."

**Where the Developers come from.**

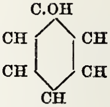
The question is sometimes asked: What are all these developers made of, and whence do they come? To answer the question satisfactorily would necessitate more chemistry than I care to inflict upon the busy reader. Briefly, it is worth noting as we pass, that almost all our modern developers are carbon compounds, and, largely, simple derivatives of the hydrocarbon benzene. We are all familiar with benzene—the colorless liquid with a characteristic odor, which has so many uses in the home and workshop—but few, perhaps, have realized that its chief use is the production of photographic developers. To the chemist benzene is a compound of six atoms of carbon, $C_6$, and six atoms of hydrogen, $H_6$, and he expresses it by the formula $C_6H_6$. If the reader will pencil the outline of a hexagon on the margin of this page, and place at each of its six points the letters CH, he will form a famous figure, known as Kekulé's hexagon formula for benzene. Kekulé published, years ago, the fact that benzene behaves in its reactions with other bodies, as though the carbon atoms were linked together round the points of a hexagon, each with a hydrogen atom attached to it, just as the reader has expressed it in his outline in the margin.

**Benzene Derivatives.**

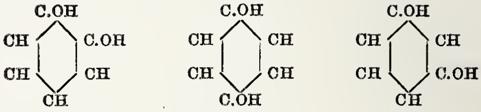
Now let us watch the birth of a developer. The hydrogen atoms in benzene are easily replaced by other atoms or groups. Thus if we replace the hydrogen atom at the topmost point of our hexagon by the group hydroxyl (HO), we get hydroxy-benzene or phenol, commonly known as carbolic acid. By replacing a second atom of the hydrogen in phenol we get three different compounds distinguished by their prefixes as *ortho*, *para*, and *meta*, hydroxy-benzene (according to the position of the second group in relation to the first), thus :



Benzene.



Hydroxy-benzene or phenol.



Ortho- Para- Meta-

hydroxy-benzene.

The significance of these changes lies in the fact that the *ortho* and *para* compounds of hydroxy-benzene, or phenol, are powerful developers of the latent image on the exposed gelatine bromide of silver film. Thus *ortho*-hydroxy-benzene is catechol, which we know as the developer pyrocatechin, and which probably forms the active agent in "Kachin." *Para*-hydroxy-benzene is quinol, which we know as the developer hydroquinone. The *meta* derivatives have little or no developing power. Thus *meta*-hydroxy-benzene, or resorcin, cannot be used as a developer. If, however, we deal with it as we treated phenol, *i.e.*, if we displace two hydrogen atoms in resorcin by two amido groups ($NH_2$), we obtain the new product diamido-resorcin, an energetic developer yielding negatives similar in character to those developed with amidol. In the same way we can modify other benzene derivatives, and secure products perhaps more useful than the unmodified form. Thus, by displacing one of the hydrogen atoms in hydroquinone by an atom of the element chlorine, Hauff has obtained an improved form of hydroquinone which is now in the market as adurol-Hauff. By these and similar subtle processes are our developers born into the world.

In our experience with these developing agents we have found that they may be combined, to some extent, with each other to work side by side, so that we get the advantages offered by each in our negative-making. Thus we use combinations of pyro and metol ; metol and hydroquinone ; eikonogen and hydroquinone ; ortol and metol.

**A Little History.**

Pyrogallol, as a developing agent, dates back to Scott Archer's wet-plate process, published in 1851. For some time after the introduction of the dry plate, ferrous-oxalate strongly contended with pyro for pre-eminence as the best developer for the new plate. Pyro, however, possessed greater "latitude" and won the day. In spite of positive disadvantages, and the attractiveness of its later rivals, it is still considered to be the most useful of known developers, and is that most widely used. Quinol, or hydroquinone, was suggested by Abney in 1880. What we know as "eikonogen" was first described by Meldola in 1881, although this name was given to it by Andresen, who introduced it commercially. In the same year Eder and Toth reported upon the developing power of catechol ; but its high price and impurity at that time were obstacles to its popularity. Latterly, the method of its manufacture has been changed, giving a pure product at a reasonable price, and it is again being exploited as pyrocatechin. In 1891, Andresen (of Berlin), and the brothers Lumière (of Lyons), published the results of their independent investigations of the developing power of benzene derivatives, and since that time one new developer has followed quickly upon the heels of another. Let us now, with this preliminary knowledge of our materials return to the consideration of their practical qualities and use.

**Classification of Developers.** Having such a variety of developing agents at hand, each possessing its own peculiar qualities, it will be profitable, first of all, to attempt some classification of them according to their predominant characteristics. Dr. Eder divides all known developers into two groups, according to the manner of their action on those parts of the sensitive film which have received different exposures. In the first group he places pyrogallol, pyrocatechin, and quinol. We may add adurol. These develop the image gradually, step by step, according to the varying intensity of light in different parts of the subject. Such developers are sometimes termed "hard working," as tending to give contrast, vigor, and brilliancy in the different tones of the negative. They are, therefore, suitable for normal and over-exposures, or for subjects where contrast is desirable. Developers of the second group, such as amidol, eikonogen, metol, and rodinal act differently; all the details of the image appear almost simultaneously, and are quickly buried, opacity being gained much more slowly. The general character of negatives developed with these developers is that of softness of image, tending to flatness in case of over-exposure unless development is restrained or held back. Such developers are therefore indicated as suitable for normal or under-exposures, or for subjects where harsh contrasts of light and shade are undesirable. Ortol, metacarbol and tolidol seem to occupy a place between these two groups, being moderately rapid in their action on a normally exposed film, and yielding detail and density in harmonious proportion as development proceeds. It is difficult, however, if not impossible, to draw hard-and-fast lines between different classes of developers, so much depending upon the method of their use. For this reason, also, it is impossible to answer the question so often asked: Which is the best developer? So much depends upon the way a developer is made up and handled, and upon what the individual worker desires.

**Essentials.** The essentials in a good developer are (1) that it shall be reasonably rapid in its action, and yet not so rapid as to be beyond control, and (2) that it will give us all the details and density required without producing "general fog," or veiling the image by acting on those parts of the film which have not been acted upon by light during the

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PEACE

THE OLD HOMESTEAD
G. E. Valleau

exposure. Apart from these essentials we usually require in a developer that it shall not unduly stain the film during development; that the color of the negative image shall be one which will yield desirable printing quality; and that it shall not discolor rapidly, so that we may use it repeatedly until its developing power is exhausted.

**Composition of a Developer.**

Now let us take up the composition of a developer. We have seen that most of our modern developers are *potential* rather than *actual* developers, *i.e.*, that they require the addition of an alkali (or a sulphite) to make them sufficiently energetic for practical use. Reason also suggests the need of something which, combined with the developer, will retard or restrain its action if this should appear desirable under special conditions. Thus an ordinary developer prepared for use is usually composed of:

**The Active Agent.**

1. The developing agent proper, such as pyro, metol, quinol, ortol, or tolidol, or a mixture of two or more such agents. This effects the blackening of the latent image by reducing it to metallic silver, hence it is known as *the reducer.* As we have already learned, most of the known reducers require the addition of another substance to energize them.

**Accelerator.**

2. An alkali, which increases the property possessed by the developing agent of absorbing oxygen, and so makes it a more energetic reducer. For this reason the alkali used in development is called *the accelerator.* We will learn more about this later. The alkalies most commonly used are sodium carbonate, otherwise known as "sal soda" and "washing soda;" potassium carbonate; caustic soda; and caustic potash. In England, liquid ammonia, .880, is largely used with pyro; and with some of the newer developers the addition of sodium sulphite alone, without carbonates or caustic alkalies, is sufficient to form a powerful developer. Latterly, on account of the inconveniences attending the use of alkalies, and especially caustic alkalies, attempts have been made to introduce substitutes. Thus tribasic sodium phosphate, and the use of acetone with sodium sulphite, have been recommended. The first does not seem to have sustained the claims made for it, but the

latter has proved a useful substitute for alkalies with pyro and hydroquinone.

**Restrainer.** 3. A restrainer, *i.e.*, a substance which has power to retard or arrest the action of the developer. The soluble bromides—potassium bromide and ammonium bromide—are those most generally used, although common salt will take the place of the former when it is not obtainable. The action of the bromide is to form a double salt, which is more soluble than silver bromide, so that potassium bromide in the developer always dissolves an amount of silver bromide out of the film. This double salt is much less easily broken up (or reduced) by the developer, so that its action is made slower. Hence the name—*restrainer* or *the retarder.* It is generally advised, except in cases of extreme under-exposure, to work with a certain amount of bromide in the developer, as it not only slows development, but also keeps the plate free from fog or veil. Some of the newer developers, however, are extremely sensitive to the addition of bromides, and this should not be overlooked. Bromide of potassium is now almost exclusively used as the restrainer, but ammonium bromide is indicated when ammonia is employed as the accelerator.

**Preservative.** 4. A preservative, *i.e.*, a substance which will keep the developer from discoloration, by which the film would become stained; as well as to keep the developing agent from oxidizing when made up in bulk for future use. Sodium sulphite and metabisulphite of potassium are the preservatives most generally used. Bothamley has pointed out that as the metabisulphite is an acid salt it may exercise an indirect effect by neutralizing part of the alkali used. To offset this he advises that five grains of sodium carbonate be added for each ten grains of metabisulphite of potassium in the developer. In America neutral sulphite of soda is used almost exclusively. The quantity of sulphite necessary in a developer varies according to the tendency of the developer to oxidize or discolor, and also upon the water used, as well as upon the color of the negative image desired. This will be browner, and consequently of greater printing opacity, the lower the proportion of sulphite present. The blue-gray and gray-black color of the negatives developed with many of the newer developers, such as *rodinal,* is the result of the large amount of sulphite added in their preparation. According to Hubl, pyro, amidol, and metol require about ten times their weight of crystallized sodium sulphite ; hydroquinone and glycin requiring but three to five times their weight. Sulphite which has become decomposed by exposure to air will give the negative a yellow, slow printing, color. Only transparent crystals should be used, or a brand which is known to be carefully prepared and of good quality, packed in glass bottles. The salt should always be neutral. Test it with litmus paper, and if only slightly alkaline, neutralize it by adding a few drops of sulphuric acid. Thus : dissolve 4 ounces of sulphite of soda in 16 ounces of water and add 20 drops of sulphuric acid. If this solution turns red litmus paper blue, the sulphite is too alkaline. To neutralize it, take away 5 ounces from the solution, and to the remainder add sulphuric acid C.P. until blue litmus paper turns slightly red. It may be necessary to add 100 drops of the acid, or less. Then add the 5 ounces of solution set aside, and the sulphite is ready for use. As preservatives of pyro and hydroquinone when made up in bulk, oxalic, citric, sulphuric and sulphurous acids are used, in addition to sodium sulphite and potassium metabisulphite.

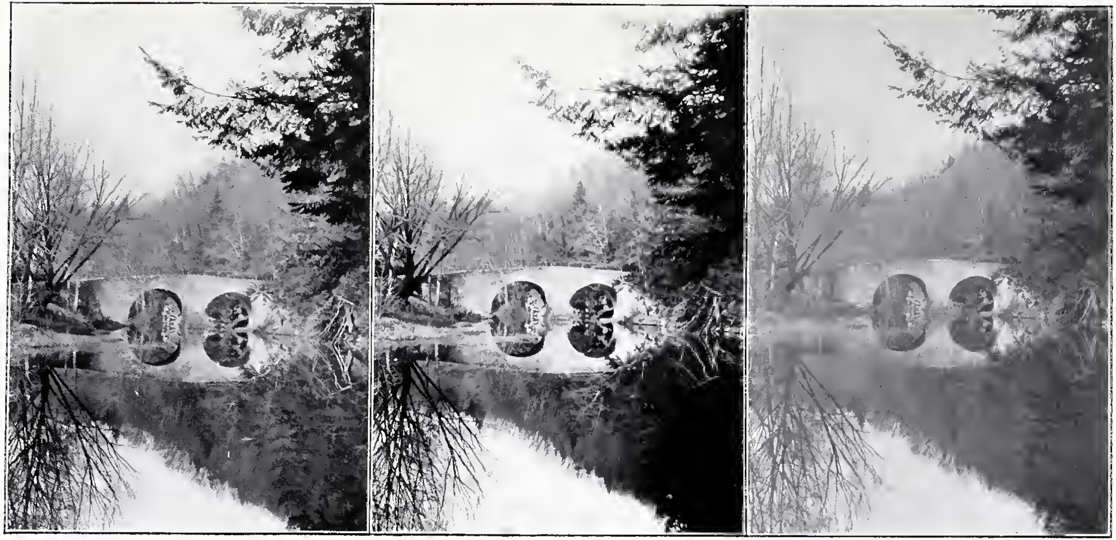
**Water.** The only other essential in the developer is the solvent or diluent—water, and this is more important than is generally recognized. That the quality of the water used in compounding a developer has much to do with success in negative-making has been proved beyond a doubt over and over again, but the detail is one commonly neglected. The differences in the action of the same developer at different seasons, or in different localities, may generally be traced to a difference in the water used. River and spring water, for instance, generally contain impurities, and the water supplied in towns may at times contain alkalies or particles of iron from the pipes, or organic matter. Wherever possible, distilled water should be used in making up a developer. This can be obtained from many chemists, and the cost is not worth consideration. Where distilled water is not obtainable, the water used should be well boiled, allowed to cool, and filtered. This will obviate fully half the troubles met with in development. Where even this is inconvenient, rain-water, melted ice, or water which has been roughly filtered, by means of a bag of canton flannel tied around the tap, should be used. The purer the water the more certain will be the action of the developer, and the point is one worthy of careful attention.

**The Alkalies.** We are now ready to take up the alkalies used in development, their importance deserving separate treatment. Much that is here said of them must be taken, however, as relatively correct rather than positive fact; our knowledge of the alkalies being small in proportion to their importance. They belong, as we have seen, to two groups: (1) The caustic alkalies—caustic ammonia, caustic soda, caustic potash, and caustic lithia; (2) the carbonated alkalies—carbonate of soda, carbonate of potash, carbonate of lithia, and carbonate of ammonia.

**Ammonia.** The use of ammonia as an alkali (or accelerator) in development is restricted to its use with "pyro" in England, and even there it is being abandoned in favor of carbonate of soda as a more stable compound. The form in which it is used is that of liquor ammonia, .880, known in America as "stronger water ammonia." Considered as an accelerator its instability (the loss of strength in the solution when the bottle is repeatedly opened) is a positive disadvantage. The chief arguments in its favor are (1) that it has greater potency, bulk for bulk, than the other alkalies, and (2) that it gives, with pyro, negatives of fine printing color and quality, with desirable general density. The use of bromide as a restrainer is almost always essential when ammonia is used as the alkali, and when used in excess, ammonia quickly produces general fog. The maximum amount of ammonia that can be used must, of course, depend upon the plate, but in the majority of cases two minims of ammonia .880 per ounce of "pyro" developer (containing two grains of pyro per ounce of water) is the maximum without bromide. With bromide the amount of ammonia may be slightly increased, the result being a reduction of density according to the amount of alkali present.

**Carbonates of Soda and Potash.** In America the use of the carbonates of soda or potash with pyro is universal; with the newer developers caustic alkalies are sometimes advised, although even here the carbonates are more generally used. Between

PLATE I.



Three examples from plates correctly exposed (3 seconds) and

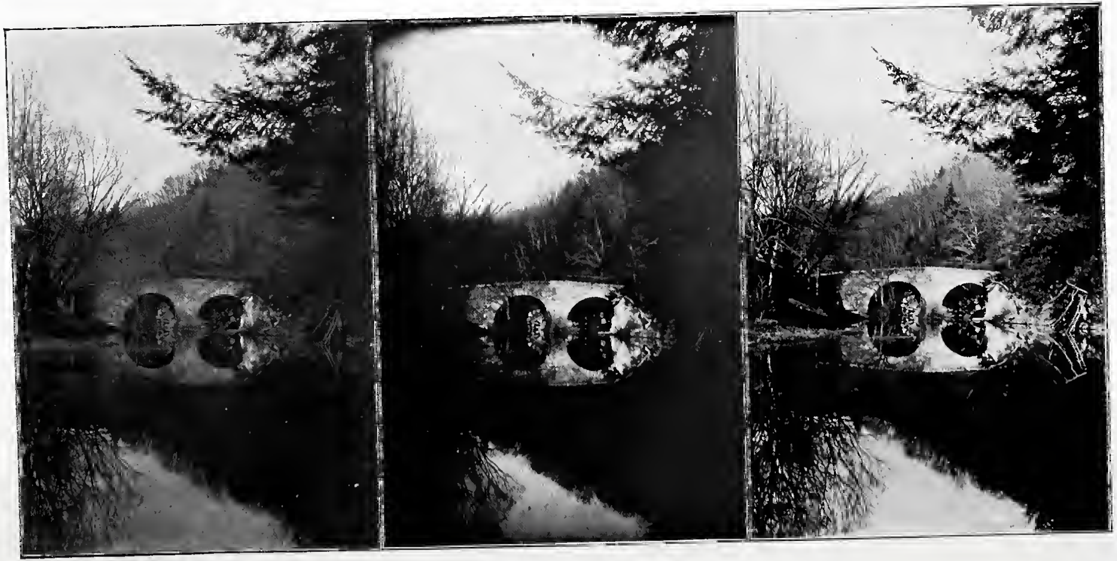
correctly developed

over developed

and under developed

to which further reference is made in the text

PLATE II.



*insufficiently developed*

*Three examples from plates under-exposed (1 second) and*
*over developed*
*to which further reference is made in the text*

*corrected in development*

carbonate of soda and carbonate of potassium there is little choice *when pure*, but the former is much more easily obtainable and most widely employed. The condition of the carbonate of soda (sal soda) is of importance. The crystals should be clean and clear, not chalky, and the drier they are the more powerful their action. Sodium carbonate comes in three forms (1) anhydrous, consisting entirely of the salt, and very liable to absorb water from the atmosphere. This is not generally obtainable. (2) Monohydrated sodium carbonate (usually known as "dried C. P.") containing eighty-five per cent. of the salt, and fifteen per cent. of water; and (3) crystallized sodium carbonate ("carb. soda cryst."), consisting of only thirty-seven per cent. of the salt, and sixty-three per cent. of water. The importance of knowing which variety is called for in a formula for a developer is obvious, but this information is rarely given. In its absence it is usually to be supposed that "carb. soda crystals" are intended. In their formulæ for the use of *Tolidol* as a developer, the manufacturers give in every case the respective amounts of "dry" and "crystallized" alkali required. The weight of "carbonate crystals" required is therein given as two and one-half times the weight of "dry carbonate." According to *Seed's Manual* one and three-fourths ounces dry, powdered carbonate of soda are equal to four ounces of ordinary "crystals." The quantity of alkali required in a developer varies a little with the time of year; in summer the proportion of alkali is reduced, in winter slightly increased.

**Caustic Alkalies.** The caustic alkalies cannot be used with "pyro," and some other developers, on account of their tendency to produce general fog. They are useful, however, with hydroquinone and other of the more recent developing agents, and are more energetic in their action than the carbonates. With some developers, such as metacarbol, their use is essential. Strong solutions of the caustic alkalies require careful handling on account of their action on the skin, but as generally used in developers, their solutions are not injurious with reasonable care. When working with developers containing caustic alkalies, it is well to have at hand a glass containing acidulated water, such as muriatic acid 2 parts; water 100 parts. Strong vinegar diluted with water will also serve the same purpose. The fingers should be dipped into this solution after the developed plate has been put into the fixing bath, when the acid solution will neutralize the alkalinity of the developer adherent to the fingers, thus preventing any possible harm.

It should not be overlooked that the alkalies, in addition to energizing the developing agent, may themselves indirectly act upon the sensitive film. An excessive amount of alkali is to be avoided as likely to induce general fog, veiling of the image, and, therefore, weak, flat negatives.

**Acetone, etc.** The attempt to banish the alkalies deserves a note. In 1896 Lumière and Seyewetz proposed the use of acetone with sodium sulphite in place of the alkalies usually employed. This has been found practicable with "pyro," hydroquinone, and paramidophenol. In the use of acetone it is found that the developing power increases with the proportion of acetone up to ten per cent., beyond which there is no advantage. The best ratio of sulphite to the acetone is one part of the former to two of the latter. Formulæ containing acetone in place of other alkalies are given on other pages so that the reader may try them for himself. The use of aldehydes (formalin, etc.) and crystallized tribasic sodium phosphate as alternative substitutes for the alkalies has also been recommended, but the advantages claimed for them have not been substantiated by experience.

**Making up Developers.** There are many different ways of making up a developer, and each method has its advocates and, perhaps, its usefulness. First come the "single solution" developers, wherein all the ingredients are dissolved and contained in a single bottle, with a liberal amount of perservative to keep the solution ready for use during a reasonable period of time. These are developers of convenience, and are largely used by amateurs who do not care to give the time or trouble required to make up many different solutions. They are often scoffed at by advanced workers, but possess their good points, as may be witnessed by results obtained with "Rodinal," Wenzel's "Orto-Metol," and other good examples of this class. Such developers are usually made up in a more or less concentrated form, and are intended to be diluted with water before their use, according to the requirements of the exposure or the character of the subject photographed. It is generally understood that those who use such developers will have at hand a ten per cent. solution of potassium bromide (restrainer), and sometimes a hint is given with the formula (or accompanying the bottle), that such a solution of alkali, or a certain developing agent, may be added in certain circumstances. Perhaps the only serious drawback in the use of these single solution developers is that they do not provide for the character of the plate used, and this is an important factor in development. Thus, some plates will not permit of the use of more than a certain proportion of alkali, which may be exceeded in the developer used, and failure may result from this cause. It is true that the strength of the developer can be reduced by dilution, and its action more or less controlled by the use of bromide ; but these "dodges" do not always bring success. Hence those who make use of single-solution developers must rely on "averages," and remember the limitations of their material.

In ordinary practice two or three solutions are made up. One contains the developing agent proper, with a preservative ; another contains the accelerator, usually with a certain proportion of sulphite of soda ; and a third consisting of the restrainer, almost invariably a ten per cent. solution of potassium bromide. For actual use varying proportions of these solutions are taken, well mixed together and, with or without dilution, applied to the plate to be developed. This is the normal or rational method of preparing a developer for use, and admits of its variation to meet every possible condition of exposure, subject, and plate. Sometimes the principle of keeping the component parts of the developer separate is carried to excess. I remember a formula which called for six separate solutions of varying strength. The author claimed that it was "elastic!" Finally, there is the "ten per cent. solution method" of preparing a developer, which calls for a separate solution of each ingredient to be used. This has been widely advocated by practical workers, and has its peculiar advantages. We will consider it later.

**Factors Influencing the Negative.**

In the composition of a developer for practical use we must consider four factors which influence the resulting negative. 1. The nature of the sensitive plate, especially with regard to the character and amount of alkali that may be used without producing general fog. This can only be known by experience with the brand of plates under consideration. 2. The character of the subject: whether contrast and vigor, or softness and detail are best suited to its interpretation. Thus, if in an ordinary view we want vigor and brilliancy, and in cloud forms or portraits we seek soft effects and detail, it is evident that the same developer will not serve for both classes of subjects. 3. The exposure: whether under, correctly, or overtimed. 4. The color and general printing quality desired in the negative as a means of securing certain other qualities in the print.

**Modifications.**

Keeping these points well in sight, the following facts may be useful in selecting and compounding developers for different requirements. The contrasts in a negative are increased by an increased proportion of the developing agent or reducer. By reducing the proportion of the reducer the contrasts are lessened but development naturally proceeds more slowly. The nature of the developing agent itself also influences the securing of contrast. Thus the "hard working" developers, pyro, hydroquinone and glycin are all adapted to give contrast in negatives. An increased proportion of alkali in the developer makes development proceed more rapidly, but tends to produce fog and reduces contrasts. By reducing the amount of alkali, we reduce the tendency toward fogging, and make development proceed more slowly with increased contrasts. Contrary to general belief the proportion of bromide (restrainer) present in the developer has little direct influence upon the contrasts in the image. One of the functions of the bromide is to prevent fog by the action of the alkali, and it thus indirectly prevents reduction of contrast by extending the time of development. As supplementary to these points I make room here for a few extracts from one of Bothamley's papers on modifications in development. He says:

**Development on and in the Film.**

In the first place, when considering modifications in development, we must keep in mind the distinction between development at the surface of the film and development in the deeper parts, which Von Hubl has so ably emphasized. When bringing out detail, we are concerned mainly with development at the surface; when gaining opacity, we are concerned mainly with development below the surface. One of the most striking differences between some of the newer and the older developers is in the relation that exists between the rate of action on the surface and that deeper down. With pyro, for example, as is well known, the different parts of the image, except in cases of considerable over-exposure, follow one another somewhat slowly. On the other hand, with metol and similar developers, as everyone who has used them knows, all the image comes out very nearly simultaneously. In other words, with metol and similar compounds, the rate of development at the surface is much higher, compared with the rate of development further in the film, than it is with pyro and quinol (hydroquinone), for example.

For this reason metol and developers of that class are more suitable in cases of under-exposure than are the older developers. So, too, when an endeavor is made to compensate for under-exposure, the proportion of alkali is increased with a view to accelerate surface development, while, when endeavoring to compensate for over-exposure, we increase the proportion of bromide, or in other ways try to retard surface development.

If these facts are kept in mind when selecting a developer for a particular class of work, and if also it is borne in mind that, as Cadett has shown, modifications in the composition of one and the same developer must be made before it is poured on the plate, if the maximum differences are desired, the number of unsatisfactory negatives may be greatly reduced.

Another point that greatly affects the printing character of a negative is the color of the deposit that forms the image, and this is often overlooked, especially by beginners. Two negatives may seem to the eye to be practically equal in opacity and in the gradation of the opacities, and may yet yield very different prints, owing to differences in the color of the reduced silver in the two negatives. This color is determined by several causes, the chief of which are (1) the character of the emulsion, (2) the nature of the developer, (3) the composition of the developing solution, and (4) the time of development. Before considering these, however, it may be as well to point out that the browner the color of the deposit forming the image, the higher is the printing opacity as compared with the apparent or visible opacity.

Although the character of the emulsion has a distinct influence on the color of the negative, this influence is perhaps not of any marked practical importance in the case of the comparatively rapid plates used for negative making. It becomes much more important with slow plates, such as are used for making lantern-slides, and, so far as any general conclusion can be drawn at all, it may be said that the slower and the more finely grained the emulsion, the greater is the tendency toward a brown color in the negative.

**The Color of the Image.**

The nature of the developer has a much more distinct influence, and here again metol and several of the newer developers may be classed together as developers that produce bluish or bluish-black negatives, the printing opacity of which tends to be low, as compared with their visual opacity. Pyro and quinol, on the other hand, tend to produce brownish negatives with a high printing opacity. This difference in color seems to be, in part, a direct effect of the different chemical nature of the developers, but it is also beyond question partly a secondary effect due to the more ready oxidation of the developer, with production of coloring matters that become firmly attached to the reduced silver. The brown image developed by an ordinary pyro developer containing no sulphite consists partly of reduced silver, and partly of the brown oxidation product of the pyro.

The practical result is that negatives that are bluish in color print as if they had been more fully exposed than apparently similar negatives of a browner color. The longer the time required for development, the greater is the tendency toward the production of a brown color, owing to the greater degree of oxidation of the developer.

In the case of the pyro developer, which is pre-eminent among ordinary developers in its tendency to produce brown coloring matter, the usual practice of adding sulphite reduces this tendency, or even prevents it altogether, by minimizing the oxidation of the pyro. An important practical point, therefore, is, how much sulphite is necessary to prevent this oxidation, and yield a negative that is not brown in color? Our own experience shows that, with sodium carbonate as the alkali, the developer, *when mixed ready for use*, should contain not less than five per cent. of crystallized sodium sulphite, but need not contain more. With a lower proportion, the deposit forming the image has a more or less marked greenish-brown tinge. In the case of pyro-ammonia, a lower proportion of sulphite is sufficient, and, if the pyro solution is made up with equal weights of pyro and potassium metabisulphite, we find that it is unnecessary to add any more sulphite, unless development is prolonged, and, as a matter of practice, it often happens that, in cases where development has to be prolonged (unless it be for correcting under-exposure), a certain extent of brownish color in the image helps toward the desired result.

We now know something about the selection and composition of a developer, and the reader is doubtless eager to take up the actual preparation and use of the developing agents available. First, however, we must know how to handle our materials in compounding them. Afterward we will take up the different developing agents in the market and their chief characteristics. The amateur who works wholly with ready-prepared developers in tubes, powders, concentrated solutions or tabloids, makes up his working solutions by the simple addition of water. The method is convenience itself, and these ready-made developers seem to grow in favor. But those who use them are always more or less "in the dark" as to just what they are using, and the proportions of the ingredients in their solutions. Hence the serious worker prefers to compound his own mixtures, modifying them as the circumstances may require. Now there is always a right way and a wrong way in preparing "chemical" solutions, and very strange things are liable to happen if we go about our mixing in the wrong way. To go into this fully would require a thorough understanding of weights and measures, the use of the hydrometer, tables of solubilities, and equivalents. These things are too big to be dealt with in a paragraph. For this reason I will give here only a few general notes, and later in the year we will have a number of THE PHOTO-MINIATURE specially devoted to "popular science" of the sort mentioned.

**Making Solutions.**

First, since in development we deal with solids and liquids which are made up into solutions of different strength, it will be useful to know something about dissolving chemicals. Perhaps the worst way of dissolving a substance is that most generally employed, viz.: putting it into a bottle with the required amount of water, and shaking the mixture until all is dissolved. By this method the substance, whether "crystals" or powder, generally "cakes" at the bottom of the bottle, and is more difficult to dissolve than in its original condition. Those who have attempted the solution of sulphite of soda in cold water are aware of this difficulty. The better way is to use a fairly wide-mouthed jug or other vessel; into this put the required amount of water (hot or cold as may be indicated); and having tied the proper quantity of the solid to be dissolved in a canvas or muslin bag, suspend the bag in the water by means of a string fastened to the handle of the jug. In this way the substance dissolves itself, without shaking or other attention. When the solution is obtained, it may be bottled. With a few substances, such as pyro, which dissolve almost instantaneously, this method is unnecessary. A point about bottling chemicals in solution is worth noting. Choose a bottle just large enough to hold the solution, so that no air is left to exercise any influence on the solution. Many chemicals, both solids and in solution, deteriorate when exposed to air, and the quantity of air in a half-filled bottle is sufficient, if left long enough, to cause some solids and many solutions to become useless. This applies especially to amidol, ammonium carbonate, ammonium persulphate, diogen, eikonogen, formalin, hydroquinone, metol, ortol, caustic potash and caustic soda, pyrocatechin, pyrogallol, and sodium sulphite. Bottles containing solutions of these should be kept filled and well corked; rubber stoppers are generally preferable to glass stoppers, but selected, sound corks well soaked in melted paraffine are as good as can be desired for most photographic uses.

**Solubilities.** The following chemicals dissolve more readily in hot than in cold water: alum, borax, hydroquinone, eikonogen, glycin, oxalic acid, potassium oxalate, sodium sulphite and "hypo." On the other hand metabisulphite of potassium and pyro should not be dissolved in hot water. Caustic potash and caustic soda, the carbonates of soda and potassium, bromides of potassium and ammonium, and citric acid all dissolve readily in cold water. It is also important to note that in the mixture of "preservatives" with developing agents, the preservatives, such as sulphite of soda, or acids, should almost invariably be dissolved first in the water. Metol is a well-known exception. When developing agents are properly prepared with preservatives their solutions usually undergo little or no change. In some cases they discolor slightly by gradual oxidation, but this discoloration does not necessarily indicate loss of developing power. A precipitate or a turbid condition of the solution, on the other hand, generally means that the developing solution has become useless for its purpose.

**"Per cent." Solutions.** When a solution has to be made up to a definite volume or bulk, the full quantity of water should not be added to dissolve the solid. In making up a ten per cent. solution, let us say of bromide of potassium (by which we mean a solution containing ten parts of the solid by weight in one hundred parts of the solution by volume), a safe rule is to take as many parts less of the liquid as there are parts of the solid to be dissolved. Thus, we dissolve one ounce of bromide of potassium in nine ounces of water, and afterward add the amount of water, ascertained by measuring the mixture, required to bring its bulk up to ten ounces. Speaking of "per cent." solutions reminds me that it may be useful to know the number of grains of a substance contained in a fluid ounce of a solution of this or that percentage. In a one per cent. solution there are 4.55 grains per fluid ounce; in a two per cent. solution, 9.10 grains; in a three per cent. solution, 13.65 grains; in a four per cent. solution, 18.20 grains; in a five per cent. solution, 22.75 grains; in a ten per cent. solution 45.50 grains: and in a hundred per cent. solution, there are four hundred and fifty-five grains per fluid ounce.

**"By Weight" Formulae.** Chemicals, except the precious metals, are bought and sold by avoirdupois weight, but photographic formulæ are usually computed to be prepared by apothecaries weight. Some few manufacturers give their formulæ in avoirdupois weight; others in apothecaries and metric weights and measures; and some others in "parts" or "volumes" of solutions the strength of which is estimated by hydrometer tests. Sometimes we see formulæ calling for definite quantities of "per cent." solutions.

Out of Babel cometh confusion! In the following pages the reader will find formulæ according to many different systems, so given because it seems best to republish formulæ in the terms in which they were originally given, and let the individual worker adopt equivalent terms to his personal taste. In translating formulæ from metric measures into American or English measures we may use the conversion tables given in any photographic annual, or, as more convenient and correct enough for all practical purposes, we may consider the figures as indicating grains, 1,000 grains of a solid approximating two ounces, while 1,000 grains (by weight) of water approximate two ounces and two drachms by volume. Where a set of metric weights and measures are available, these, of course, are most convenient for the preparation of mixtures expressed in these measures. The suggestion given for translating formulæ in metric measures is equally applicable to those expressed in parts. The method given for preparing a ten per cent. solution also indicates how solutions of different percentages may be prepared. Thus, to make a twenty per cent. solution of sulphite of soda, dissolve two ounces of sulphite in eight ounces of hot water, pour the mixture when dissolved into a graduate, and add water to make the bulk of the solution up to ten ounces. Similarly, by dissolving one ounce of caustic soda in nineteen ounces of water, and afterward making the solution up to twenty ounces bulk, we get a five per cent. solution.

**"The Hydrometer Test."** The use of the hydrometer in preparing developers applies only to the making of solutions of sulphite or the alkalies. It is supposed to insure solutions of uniform strength, an advantage where one has to deal with chemicals which lose their strength or vary in condition. Thus if we make up a solution composed of sulphite of soda, crystals, four ounces; in water, sixteen ounces, *by weight*, we get a solution of a certain strength. But when next we set about preparing a solution with the same ingredients in identical proportions, we may or may not get a solution of the same strength or power as the one first prepared. It may be of greater strength, or less powerful, according to the condition of the sulphite we use, and sulphite varies a great deal. But if we had poured a little of the solution first prepared into the hydrometer and noted that it "tested" or indicated the figure 60, and the second solution gave only the figure 40 by hydrometer "test," we would know that our sulphite was inferior to the early sample, and strengthen the second solution by adding more sulphite until it would give us the figure 60 by hydrometer test. Hydrometers, however, as used by photographers, are seldom accurate in their readings, and it is better to first make up a formula by weight and then, noting the reading given by the solutions on the hydrometer, make future solutions accordingly.

**Measuring Dry Substances.** In measuring dry substances, however, extreme accuracy is seldom essential, especially when one considers the inaccuracy of the average graduate upon which we depend for our volumes of liquids. The reader will, therefore, find it convenient to make for himself a few rough but approximately correct measures for the substances most generally used. Thus a few pieces of test-tubes of varying length, sealed at one end and marked at the points reached by varying quantities of this or that solid, will save much troublesome weighing. A piece of test-tube marked off to indicate 25 grains, 50 grains, 120 grains, 240 grains, and one ounce of sodium sulphite, *crystals*, may serve as an example of this method. For measuring liquids the ordinary graduate, is, of course, equally convenient and not more reliable.

**Mixing Developers.** In mixing a developer, the usual course is to take up the ingredients in the right quantities, and mix them in the order given in the formula. Where specific instructions are given as to the order of mixing, these should be followed unless obviously incorrect. Such instructions are, however, rarely given, and a few hints may be useful. In making up solutions of pyrogallol the preservative (sodium sulphite or an acid) is *first* dissolved in the water, and the pyro added last. If the preservative includes sulphuric acid, this should be added drop by drop with stirring or the sudden formation of heat may cause the bottle to crack. The same instructions hold good for amidol; this developer does not keep well in solution. It is, therefore, usually added to a solution of sulphite of soda just before use. Hydroquinone is very sparingly soluble in cold water, and is usually mixed with a boiling solution of sodium sulphite. A better plan is to dissolve the hydroquinone in a small quantity of alcohol, and then add the alcoholic solution to the aqueous solution of sulphite of soda a little at a time with vigorous shaking after each addition. In making up metol developer, the usual order is reversed, *i.e.*, the metol must *first* be completely dissolved in cold water, and the sulphite added afterward. Wherever hot water is used in making up solutions, the mixtures should be allowed to cool before other ingredients are added. Eikonogen dissolves with difficulty, not more than 4 parts being soluble in 100 parts of cold water; in boiling water, however, as much as 12 parts in 100 may be dissolved. It deteriorates very rapidly in solution, four times its weight of sodium sulphite being required as a preservative. Glycin dissolves most readily in hot alkaline solutions. Ortol and pyrocatechin dissolve readily in cold water, but imogen requires hot water if quick solution is desired. In preparing developers for use during the summer, it is generally advisable either to lower the amount of alkali given in the formula, or to double the quantity of water called for. The character and amount of the alkali present in the developer largely control the speed of its action; the character and amount of developing agent present, and the length of development, largely control the density of the negative. Let us now take up the different developing agents in the market and the formulæ given for their use. We will begin with pyrogallol, the first developer used with gelatine dry plates and still that most generally used by photographers everywhere. Very much that is here said about development with "pyro" may be applied in the use of other developers, hence I will deal with it perhaps more fully than with any of its competitors.

**Pyrogallol.** Pyrogallol, although known as pyrogallic acid, is not an acid. Commercially, it comes as a very light and very bulky mass of white, snow-like leaflets. In its dry state it changes very slowly in the air, but in solution it quickly absorbs oxygen and turns brown. This reveals its one great disadvantage, *i.e.*, its tendency to stain whatever it comes in contact with—the gelatine film of the negative, the fingers, and clothes. But I have met with people who stoutly asserted that in their long experience they had never known "pyro" to stain. The oxidation of pyro in solution, which is responsible for its staining qualities, is prevented by the addition of a preservative to the solution. Sulphite of soda is most generally used for this purpose and an acid to ensure freedom from the slightest alkalinity of the mixture. Sometimes an acid only is employed, such as oxalic or sulphuric acid, or an acid salt, such as metabisulphite of potassium. A few weeks ago I saw sulphite of ammonia advised by a practical man, as " worlds better than sulphite of soda," but I have not yet tested his suggestion. The popularity of pyro is due to the fact that it gives a powerful developer which is easily controllable, and which can be adjusted to the most variable conditions. For instance: it will do its work, and do it well, with additions of alkali, or bromide, or water such as would render many other developers quite useless. And it gives a negative of fine printing quality. Under normal conditions it oxidizes so rapidly that it can be used only once, but it *can* be made up so that it may be used repeatedly, and in spite of the " fresh solution every time " disadvantage, pyro is an economical developer, capable of doing all that any other developer will do, claims to the contrary notwithstanding.

The alkali now most largely used with pyro is carbonate of soda ; in England ammonia .880 is used, principally by the older workers ; and infrequently we come across a formula combining pyro with carbonate of potassium. Recently the brothers Lumière have shown that acetone may be used in place of the alkalies with pyro, and that its use offers certain advantages distinct from the pleasure of not being obliged to work with strongly alkaline solutions. The innovation has found considerable favor.

Like many of its fellows pyro can be combined with another developing agent with possible advantage. Thus we have pyro-metol, a mixture which is said to offer the combined qualities of a hard working (density giving) developer with those of a soft working (detail giving) developer. But those who know their pyro say the mixture is an unnecessary one.

**Pyro-Soda.**

With carbonate of soda as the alkali, pyro (under normal conditions) acts with moderate rapidity. The image appears gradually, and the building up of density, or opacity, proceeds harmoniously with the appearance of detail. With correct exposure the range of gradation in a pyro-soda negative is altogether pleasing ; with under-exposure and forced development (by the addition of alkali) the contrasts are harsh and the shadows become veiled; with over-exposure and restrained development (by lessening the amount of alkali and adding bromide) a weak and somewhat flat image results. There must be a nice balance between the developer and the plate used, and the worker must know by experience with both how to keep that balance between them in spite of the disturbing influence resulting from variations in exposure or local conditions.

The formula for a normal pyro-soda developer, which I have used for years as a base, modifying for the individual exposure or subject as required, is as follows: *Lovell's Pyro-soda.* No. 1. Add ten drops of sulphuric acid (a drop at a time) to six ounces of cold boiled water; then add one ounce of pyro, and cork the bottle well. This forms the stock solution of the *reducer*, and will keep in good condition for fully a month. No. 2: Dissolve sulphite of soda (crystals), six ounces; and carbonate of soda (clear crystals), four ounces; in fifteen ounces of hot water. When thoroughly dissolved filter and bottle. This forms the stock solution of the *accelerator*. For the development of a normal exposure take one drachm of No. 1; one-half ounce of No. 2; and add to the mixture three ounces of water (in summer four ounces of water). With this developer the image usually appears within a minute, generally less, and development is complete in six or eight minutes. If the image comes up too quickly, indicating more or less over-exposure, quickly pour the developer from the plate into a graduate, flood the plate with water, and add to the developer in the graduate three or four drops of a ten per cent. solution of potassium bromide. Pouring the water from the plate, reflow it with the modified developer and let the image come up gradually, adding a few drops of the stock solution No. 2 to set the reducer in action again. If, on first flooding the plate with developer, the image does not appear within a minute or two, thus indicating under-exposure, add a few drops of the accelerator. This should bring the details out before the high lights pile up too much opacity. If it fails, pour the developer from the plate into the graduate, flood the plate with water, add to the developer ten drops (more or less) of a ten per cent. solution of caustic soda, and flood the plate with this.

Where error in exposure is known or surmised before development is begun, the modification of the developer by changing the proportions of Nos. 1 and 2 is the better remedy, and less liable to produce fog than the *after* addition of alkali or bromide. Thus in case of over-exposure known before development, make up the developer as follows: Take of No. 1 one drachm; of No. 2 one drachm; and add four or five ounces of water. A few drops of the bromide solution may be added if required.

In cases of under-exposure, where the normal developer will give a hard negative with strong contrasts, either one of the following methods may save the plate. (1) Development must be rapid, to get as much detail as is possible before the lights acquire overmuch density. To accomplish this, increase the amount of alkali cautiously and reduce the pyro, using no bromide, but adding water if the development proceeds rapidly toward fog. (2) As soon as under-exposure is indicated, at once dilute the developer with an equal amount of water, and reflow it over the plate. Now add a little diluted alkali solution either to the whole bulk of the developer, or apply it to those parts of the plates which refuse to develop, by means of a camel's-hair brush applied locally. For extreme under-exposure, pour the developer back into the graduate, flood the plate with water, and then with a solution of the alkali alone, to which a few drops of caustic soda are added, drop by drop, as required to bring up detail. When the requisite detail is secured, increase the pyro until the plate has sufficient density. For subjects broadly lighted and a plate fully exposed, increase the proportion of pyro and dilute the alkali solution, thus slowing development and giving the lights time to build up the density essential to contrast.

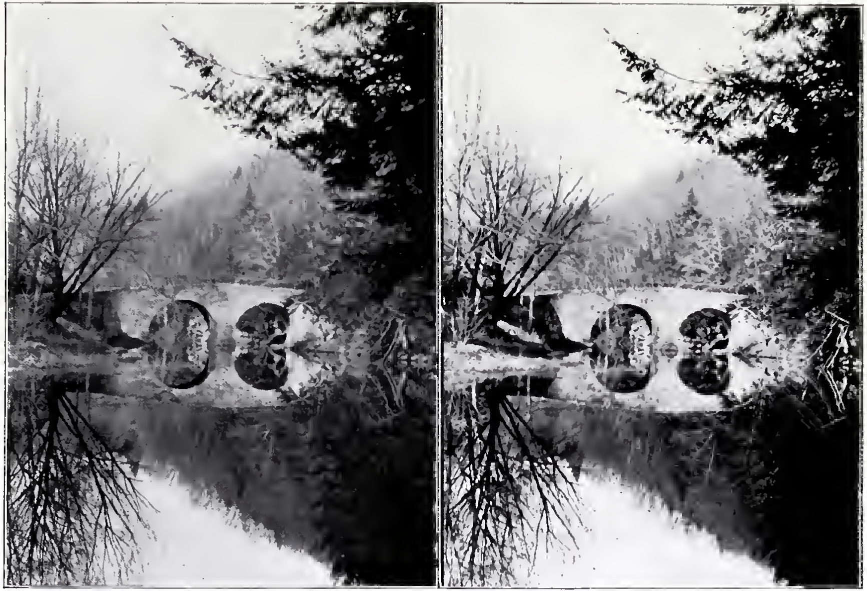
**Other Formulae.** There are so many good formulæ for development with pyro-soda that it is difficult to choose among them. I give a few which have been proved in the hands of practical workers. *Moreno's Formula*, intended for approximately correct exposures. Prepare three stock solutions: A. Saturated solution sulphite of soda; B. Saturated solution of carbonate of soda; C. Saturated solution of sulphite of soda, 6 ounces, to which 2 ounces of dry pyro are added. The quantities prepared of A and B may be 16 ounces of each solution. To make a normal developer take ½ ounce of C, 2 ounces of A, and 1 ounce of B. The proportions of B and C may, of course, be varied in case of under or over-exposure, while the amount of A present decides the color and clearness of the negative. This developer may be used repeatedly by the addition of a little fresh solution to the old developer, and is, indeed, said to work better after use than when newly prepared. Thus, after developing a batch of plates, pour the used developer into a bottle set apart for that purpose, and fill the bottle up with unused developer.

*Bothamley's Formula.* Prepare a stock solution of pyro as follows: dissolve 1 ounce of metabisulphite of potassium in 8 ounces of water with the aid of heat, allow to cool and add 1 ounce pyrogallol, after which make the solution *up to* 10 ounces with water. For the working solutions prepare A. Dilute pyro solution: water, 10 ounces; stock pyro solution, 1 ounce. B. Soda solution: sodium carbonate crystals, 1 ounce; sodium sulphite, 1 ounce; potassium bromide, 10 grains; water to make the solution up to 10 ounces. The sulphite and carbonate are first dissolved in 8 ounces of hot water, and the bromide is added; the solution is then allowed to cool and water added to make the 10 ounces.

For use, mix equal quantities A and B. The image, with normal exposure, will appear within one minute and density follows the appearance of detail with regularity. For under-exposure dilute the developer with an equal amount of water; for slight over-exposure add small quantities of dilute pyro solution and a ten per cent. solution of potassium bromide; in case of extreme over-exposure as much as 40 minims of a ten per cent. solution of bromide may be added per ounce of developer, but this amount cannot be exceeded with safety. A more rational way of dealing with over-exposure is to modify the developer before development by simply using only one-half the normal quantity of alkali. The remainder may be added, with bromide, if it seems desirable, a little at a time until development is complete.

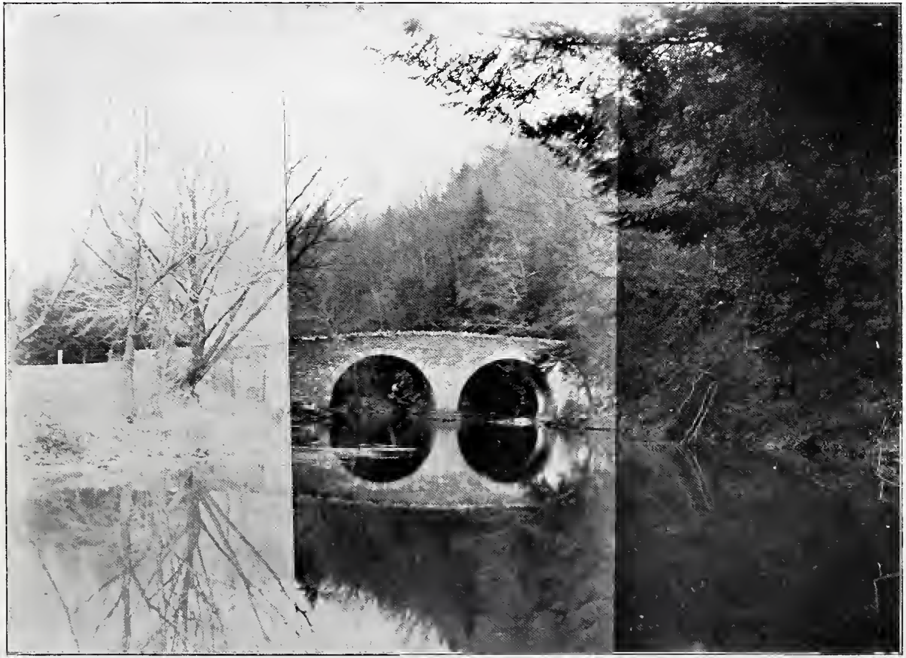
*Carbutt's Formula,* in which the pyro is used "dry." Make up a stock alkaline solution as follows: sodium sulphite, crystals, 2 ounces; sodium carbonate, crystals, 2 ounces; dissolved in 10 ounces of hot water. By

PLATE III.



*Two examples from plates over-exposed (9 seconds) and*
*insufficiently developed* *and* *corrected in development*
*to which further reference is made in the text*

PLATE IV.



*Exposure 9 seconds* *Exposure 3 seconds* *Exposure 1 second*

*An illustration of the effects produced by exposures of different length on the same plate, not corrected in development; to which further reference is made in the text* diluting this with water to make a solution having one of the three strengths, a developer may be had which, after the addition of pyro, is suitable to almost all classes of subject. Solution I. To 1 ounce of stock solution add 5 ounces of water. Solution II. To 1 ounce of stock add 8 ounces of water. Solution III. To 1 ounce of stock add 10 ounces of water. The 1 to 10 may be considered as a weak solution; the 1 to 8, medium; and the 1 to 5, a strong solution. To any one of these may be added dry pyro in the proportion of 1 to 5 grains per ounce of solution used. Slow plates are to be treated with a developer fairly strong in alkali; rapid plates require a larger proportion of pyro. For general purposes the 1 to 8 solution, with from 1 to 3 grains of dry pyro to the ounce, will form a useful developer.

*Seed's A. B. C. Pyro-soda.* A. Water, 10 ounces; sodium sulphite, crystals, one-half ounce. Add pure acetic acid to this to turn blue litmus paper red; then add, pyro 1 ounce. B. Water, 16 ounces; sodium sulphite, crystals, 4 ounces. C. Water, 6 ounces; carbonate of soda, crystals, 4 ounces. For use, take of A, 2 drams; of B, 4 drams; of C, 4 drams, and add 4 ounces of water. For double-coated plates use 9 ounces of water. *Note*, more water gives soft effects; less water gives contrast. Use less water in cold weather. If acetic acid tends to soften the film during hot weather substitute sulphuric acid.

The best ready-prepared pyro-soda developer of which I know is that obtainable commercially as *Pyrox.*

*Cramer's Formula. Pyro Solution:* Dissolve 1 dram sulphite of soda, crystals, in 6 ounces of water (distilled or pure ice water); add acetic acid until the solution turns blue litmus paper red; and finally add 1 ounce pyro. *Alkaline Solution:* Dissolve 5 ounces of sodium sulphite, crystals, and then add 2½ ounces carbonate of soda, crystals, in 30 ounces of water. This solution must be kept in well-stoppered bottles. A smaller amount of sulphite will yield a negative of warm tone; a larger amount will give gray or bluish-black negatives. If the negatives show yellow stain, make a new alkaline solution or procure a new sample of sodium sulphite. For use, mix as follows: 1 dram pyro solution; 1 ounce alkaline solution; add 2 ounces of tepid water (for winter use) or 3 to 5 ounces cold water (for summer use). If the high lights in the negative are flat, use more pyro solution; if the contrasts are too strong, use more alkaline solution. Too great an amount of alkali causes fog.

*Hammer's Formula.* This developer yields vigorous negatives. No. 1. Dissolve 2½ ounces sodium sulphite, crystals, and 1¼ ounces carbonate of soda, crystals, in 15 ounces of water. No. 2. Dissolve 8 grains oxalic acid in 12 ounces of water; and add one-half ounce of pyro. To develop take 1 ounce of No. 1; one-half of an ounce of No. 2; and add 3 ounces of water. Vary the amount of water according to the season. The quantity of sodium sulphite given is also variable, according to the quality of the water, or the color wanted in the negative, etc.

**Pyro-Potash.** The use of potassium carbonate in place of sodium carbonate as the alkali with pyro is preferred by not a few workers. The potassium salt is more active, and gives a more energetic developer, so that development proceeds more rapidly. Plates developed with pyro-potash are sometimes said to yield more detail than those developed with pyro-soda. And it is claimed that the potassium salt penetrates the film more thoroughly than soda, thus helping the reducer to do its work more effectively. It is highly deliquescent, and commercial varieties generally contain a large amount of water, hence it should be dried before use. A good formula is that advised by Hammer: *No. 1.* Water, 16 ounces; sulphite of soda, crystals, 4 ounces; carbonate of potassium, *dry,* ½ ounce. *No. 2.* Dissolve 8 grains oxalic acid in 12 ounces of water, and add ½ ounce of pyro. For use take of *No. 1,* ½ ounce; of *No. 2,* 2 drams and add 1½ to 3 ounces of water. If the high lights are too dense, dilute the developer; if too thin, use less water.

**Pyro-Ammonia.** The use of ammonia .880 as the alkali in pyro development is being steadily abandoned, for reasons already given. Those who favor it claim that it gives a more rapid and yet more easily controlled developer than the other alkalies; and it does not tend to frill the plate in hot weather as the carbonated and caustic alkalies do. Bothamley gives as a reliable formula: *No. 1.* Dissolve 1 ounce potassium metabisulphite in 8 ounces of water; allow to cool, and add 1 ounce of pyro. *No. 2.* Ammonia .880, 1 ounce; water, 10 ounces. *No. 3.* Ammonium bromide, 1 ounce; water, 10 ounces. This, by the way, is an example of the use of ten per cent. solutions in development. For each ounce of developer required, take 20 minims of No. 1; 20 minims of No. 3; 40 minims of No. 2, and make up to 1 ounce by adding water. The maximum amount of No. 2 which can be used per ounce of developer is 60 minims; more than this will cause general fog. Too low a proportion of bromide is to be avoided. As a rule the more rapid the plate the less alkali may be used with safety. The proportions of Nos. 1, 2, and 3, however, may be considerably varied when the operator knows his plate and has had some experience with the use of ammonia in development.

**Pyro-Metol.** Since the introduction of metol as a developer it has been found that the combination of this agent with pyro gives a developer which, in the hands of the average worker, produces more good negatives from a batch of unequally exposed plates than can usually be obtained with either developer used singly. The characteristics of the two agents are, as we know, radically different from each other. Pyro belongs to the hard-working or density-giving developers, development taking place *in* the film rather than *on* the surface. This, with slight under-exposure, will often give a harsh negative, the high lights acquiring too much density before all the detail is out. Metol, on the other hand, belongs to the soft-working or detail-giving developers, development resulting in a detailful image on the surface of the film, while density is secured somewhat slowly. By combining the two in one developer we may secure the peculiar advantage of each of them. Innumerable formulæ for their combination have been published. I give two or three which experience has shown to be reliable.

*Lovell's Formula.* No. 1. Water, 16 ounces; oxalic acid, ¼ ounce; pyro, 1 ounce; potassium bromide, 16 grains. Dissolve in the order given. No. 2. Water, 32 ounces; sodium sulphite, crystals, 4 ounces; carbonate of soda, 2 ounces. For use take ½ ounce of No. 1; 2½ ounces of No. 2; and add from 1½ to 3 ounces of water. In summer, or for soft, delicate negatives, increase the amount of water. Less sulphite and more carbonate in No. 2 will give an olive-colored negative with fine printing quality.

*Bardwell's Formula.* In this developer No. 1 and No. 2 are interchangeable, the first being used with

No. 3 for strong negatives; No. 2 and No. 3 being employed for soft effects. By increasing the amount of sulphite clearer negatives are obtained. *No. 1.* Water, 8 ounces; metol, 18 grains; sulphite of soda, crystals, 360 grains; pyro, 22 grains; citric acid, 24 grains; bromide of potassium, 4 grains, or *No. 2.* Water, 8 ounces; metol, 18 grains; sulphite of soda, crystals, 360 grains; pyro, 22 grains. *No. 3* (the usual alkali solution). Water, 8 ounces; carbonate of potassium, 1 ounce. For use take 1 ounce of *No. 1* (or *No. 2*, according to the kind of negative desired), and 1 ounce of *No. 3*, adding 1 ounce of water to the mixture.

*The Imperial Standard Formula* is a great favorite with English workers; here is the formula: *No. 1.* Water, 20 ounces; potassium metabisulphite, 120 grains; pyro, 55 grains; potassium bromide, 20 grains. *No. 2.* Water, 20 ounces; carbonate of soda, 4 ounces. Use boiled water in preparing these solutions, allowing the water to cool in *No. 1* before adding the pyro. For use take equal parts of *No. 1* and *No. 2.* This developer may be diluted (a) if it works too rapidly; (b) if the high lights become over-dense; or (c) in case of under-exposure where detail is desired without excessive contrasts. Equal parts of a mixture of No. 1, No. 2, and water will double the normal time required for development.

**Pyro-Acetone.** The substitution of acetone for the alkalies generally used in development with pyro is said not only to do away with the inconveniences attending the use of alkalies, but also to yield a more energetic developer permitting shorter exposures. (?) Personally I have found pyro-acetone cleanly, simple, and practical. It gives, with normal exposure, a brownish-gray negative, does not soften or frill the film, and is practically stainless. *Bardwell's Formula* is as follows: Water, 4 ounces; saturated solution of sodium sulphite, 4 drams; acetone, 2 drams; dry pyro, 10 grains. This is a single-solution developer, and may be modified by the addition of water for soft effects; or with a little of the usual ten per cent. solution of potassium bromide if a restrainer is needed. A good English formula for a two-solution developer is that given by McWalter: No. 1. Water, 9 ounces; sodium sulphite, crystals, 1 ounce. When solution is obtained, add pyro, 100 grains. No. 2.

Water, 10 ounces; acetone, 2¼ to 2½ ounces. For use, take equal parts of each. In case of over-exposure decrease the amount of No. 2; for under-exposure add an increased quantity of No. 2. Bromide of potassium should be added carefully, as this developer responds to it with great sensitiveness.

**Ortol.** Next to pyro it is generally conceded that the comparatively new developer ortol is one of the most satisfactory agents available for negative development. Ortol is related to metol, rodinal, etc., and comes in the form of grayish-white crystalline powder. It is readily soluble in cold water, and behaves much like pyro-soda, but does not stain the fingers or plates, and has little tendency to produce fog. The image is brownish-black in color; appears in a minute or so with a well-timed exposure, and grows in intensity more rapidly than with pyro, but not so quickly as with metol. As a developer it is very sensitive to bromide of potassium, and it may be used repeatedly. On the whole it may be said that ortol is the most interesting of the new developers, and one which the beginner can take up with profit. A good two-solution developer is that given by *Cramer:* No. 1. Water, 10 ounces; metabisulphite of potassium, 35 grains; ortol, 70 grains. No. 2. Water, 10 ounces; carbonate of soda, crystals, 2 drams; sulphite of soda, crystals, 2¼ to 2½ drams; bromide of potassium, a few drops (2 to 6); and 2 drops of a 1 in 20 solution of hypo-soda. For use take equal parts of No. 1 and No. 2. According to Bothamley No. 2 may be simplified by using 1 dram each of the sulphite and carbonate instead of the quantities given, and the hypo-soda may be omitted without disadvantage.

**Wenzel's Orto-Metol.** In my own experience I prefer to combine ortol and metol, using the single-solution developer according to Wenzel's formula: Water, 10 ounces; metol, 12 grains; potassium metabisulphite, 6 grains; ortol, 18 grains; sulphite of soda, crystals, one-half ounce; carbonate of potash, 80 grains; potassium bromide, 5 to 10 grains; and 1 grain hypo-soda. For negatives this may be diluted with an equal bulk of water just before use, or in some cases with twice its bulk of water. Where under-exposure is indicated the undiluted developer may be used with advantage. This is a clear working, stainless developer and gives a negative very similar to one developed with pyro-metol. Used with a little bromide, it is excellent for lantern slides, transparencies, and bromide paper. For those who prefer a two-solution developer Wenzel's orto-metol in that form, obtainable from dealers, may be advised. In using ortol or orto-metol it should not be forgotten that the negative image they give has greater apparent (visual) opacity than actual (printing) opacity: hence the development should be carried a little further than with pyro to allow for this difference.

**Hydroquinone.** Hydroquinone is similar in composition to pyrogallol, but tends to give stronger contrasts and cannot be modified as easily as pyro. It gives clear negatives, without danger of fog, and works considerably slower than pyro or metol, especially during cold weather or in cold solutions. It is not suitable for instantaneous photography, but gives the most pleasing results with full-time exposures; and is especially useful in copying, or wherever contrasts are desirable. A good single-solution developer is made up as follows: Water, 10 ounces; sodium sulphite, 4 ounces; hydroquinone, 200 grains; caustic potash, 200 grains; potassium ferrocyanide, 120 grains. Dissolve in the order here given. For under-exposure use the solution at its full strength; for over-exposure use old (used) developer, or dilute new developer with an equal amount of water. The solution may be used repeatedly. For a two-solution developer I prefer that given by Hegarty. Prepare *A*. Water, 16 ounces; sulphite of soda, crystals, 2 ounces; dissolve and filter, then add hydroquinone, 120 grains. *B*. Water, 16 ounces; carbonate of potash, 1½ ounces. For correct exposures mix one ounce each of *A* and *B*, and add one ounce of water. Slight over-exposure and slow development (by decreasing the amount of alkali solution) gives the most brilliant negative. The temperature of the solutions should not fall below 72° Fahr.

**Hydroquinone and Eikonogen.** The introduction of eikonogen, with its marked tendency to produce negatives characterized by great softness and harmonious contrasts, led to the combination of this agent with hydroquinone. *Seed's Eikonogen-hydroquinone Formula* is typical and may be relied upon. *No. 1.* Distilled or pure water, 16 ounces; sodium sulphite, crystals, 2 ounces; eikonogen, 120 grains; hydroquinone, 30 grains. *No. 2.* Water, 16 ounces; potassium carbonate, 2 ounces. To develop, take 2 ounces of No. 1; 1 ounce of No. 2; and add 1 ounce of water. A larger amount of water gives less contrast and density. For double-coated plates use five times this proportion of water in compounding the working solution. Hydroquinone may also be advantageously combined with metol, as in the well-known M. Q. developer; or with "Rodinal." Formula for these combinations will be given later.

**Adurol.** This is a very recent modification of hydroquinone and will undoubtedly be warmly appreciated by those who favor hydroquinone while fully recognizing its defects. As prepared by Hauff, adurol is formed from hydroquinone by the displacement of one of its hydrogen atoms by an atom of the element chlorine; its systematic name is chlorhydroquinone. It alters very little by exposure to air, and is more readily soluble in water than hydroquinone. Adurol is also a more energetic developer than hydroquinone when potassium carbonate is used as the alkali; and its action is more uniform in varying temperatures. Hydroquinone is almost inconveniently sensitive to the addition of potassium bromide; adurol permits its use within reasonable measure. As far as the appearance of the image is concerned, adurol comes between hydroquinone and the more rapid developers, metol, etc. The developer keeps well in solution, and may be used repeatedly. *Hauff's Formula* for a concentrated single-solution developer: Water, 10 ounces; sodium sulphite, crystals, 4 ounces; potassium carbonate, 3 ounces. Dissolve thoroughly by heat, allow the mixture to cool, and add adurol ½ ounce. For portraits and subjects requiring abundant detail dilute 1 ounce of this with 3 ounces of water. If slight fog is indicated add 10 drops of a ten per cent. solution of potassium bromide to each 4 ounces of developer. *Two-solution Developer. No. 1.* Water, 10 ounces; sodium sulphite, crystals, 1¾ ounces; adurol, 85 grains. *No. 2.* Water, 10 ounces; potassium carbonate, 1¼ ounces. For average outdoor exposures use equal quantities *No. 1* and *No. 2.* For fully timed exposures take 1 ounce each of No. 1, No. 2, and water. Bromide is to be used as a restrainer where its need is indicated. A more energetic developer is obtained by increasing the amount of carbonate in *No. 2* to 2 ounces.

**Amidol.** This developing agent is little used in negative making, having been found to be better adapted to bromide papers and lantern slides. It comes as a gray crystalline powder, very soluble, and not keeping well in solution even with sodium sulphite. It gives a clear, stainless negative, without fog, and has the peculiarity that it forms an energetic developer in the presence of sodium sulphite alone, without the addition of caustic or carbonated alkalies, and the solution may be used repeatedly until exhausted. A concentrated developer may be prepared as follows: Water, 13 ounces; sodium sulphite, crystals, 2½ ounces; when thoroughly dissolved add amidol, ¼ ounce. This solution will keep fairly well in bottles completely full and well corked. For use, take 1 ounce of the concentrated solution and dilute with 3 or 4 ounces of water. Another method is to prepare a solution of 1¼ ounces of sodium sulphite in 25 ounces of water, and just before use add 3 grains of amidol (dry) to each 1¼ ounces of the sulphite solution required for development. In case of over-exposure add 40 to 60 drops of a ten per cent. solution of potassium bromide to each ounce of developer. A saturated solution of potassium carbonate, added drop by drop to the developer, greatly accelerates the progress of development, which should be pushed further than with pyro-soda, as the image loses strength in the fixing bath.

**Metol.** Of all the "modern developers"—those introduced since pyro—metol has undoubtedly won the widest favor. It is a pale, buff-colored powder, which keeps indefinitely in the solid state, is reasonably soluble in warm water, and even in solution decomposes slowly, especially if kept in full, well-corked bottles. The solid or strong aqueous solution, however, will stain the fingers like pyro, so that a preservative is usually added. This is almost invariably sulphite of soda, which should be neutral, and in quantity about ten times the weight of the metol in the solution. Like amidol, metol gives with sulphite alone a fairly energetic developer, but it is generally used with an alkali to gain rapidity. Combined with sulphite and an alkali, metol is a very active developer, and is remarkable for the amount of detail it will give even with short exposures. The characteristics of negatives developed with metol are softness and detail, and it is perhaps the most useful of the "soft working" developers, density being yielded somewhat reluctantly. For this reason it is often combined with a "hard-working" or density-giving developer; thus we have pyro-metol, orto-metol, and metol-hydroquinone. When used alone with normal exposure, metol gives the image very quickly, all the details appearing simultaneously. This, however, is simply surface development, and the plate should not be removed until the high lights are seen to have the density required when the image is viewed by transmitted light. In other words, it is chiefly important, in developing with metol, to see that the density secured is real and not only apparent. When used with sulphite metol does not stain, nor will it give fog under ordinary conditions. A little bromide is usually added, however, to control the rapidity of the developer. The image in a metol-developed negative is black in color, and usually loses somewhat in fixing, for which allowance must be made in development.

From this it will be seen that metol offers peculiar advantages for the development of instantaneous exposures, or for detailful subjects photographed in a dull light. With such work it yields, in the hands of the average worker, more satisfactory results than many of the other new developers. A two-solution developer will be found preferable, and a good formula is given as follows: *No. 1.* Water, 16 ounces; metol, ¼ ounce; when thoroughly dissolved add 2½ ounces sulphite of soda, crystals. *No. 2.* Water, 16 ounces; potassium, 1¼ ounces; bromide of potassium, 10 grains. For a normal exposure, take 1 ounce of No. 1; ½ ounce of No. 2; and add 1½ ounces of water. In dealing with over-exposure the amount of alkali should be decreased, and a slightly larger amount of No. 1 added, with a few drops of bromide solution. For under-exposure, take ¼ ounce of No. 1; ½ ounce of No. 2, and 1¼ ounces of water. A reliable single-solution developer is made up as follows: Water, 16 ounces; metol, ¼ ounce; dissolve thoroughly and add sulphite of soda, crystals, 2½ ounces; carbonate of soda, 1½ ounces; and 20 grains of potassium bromide. For normal exposures take 1 ounce of this stock solution and dilute with 1 ounce of water. For under-exposure, take 1¼ ounce of developer, dilute with 2½ ounces of water, adding 10 grains of bromide solution to the mixture. Over-exposure must be remedied by development to secure detail only, and then intensification, or the addition of a few drops of hydroquinone solution, composed of hydroquinone, 8 grains, in 1 ounce of alcohol. With some people the use of metol developer has produced an irritation of the skin. According to Eder and other authorities this is due rather to the alkali than to the metol, but prudence suggests a change of developers in such instances.

**Metol-Quinol.** From the many combinations of metol and hydroquinone published I give Lovell's formula as simple and efficient. Water, 16 ounces; metol, 45 grains; hydroquinone, 90 grains; sulphite of soda, crystals, 2 ounces; carbonate of soda, 2 ounces. For normal exposures take 1 ounce of this, and add 4 ounces of water. For instantaneous or uncertain exposures, dilute 1 ounce of developer with 10 ounces of water; when detail appears, throw off this diluted solution, and use the normal mixture 1 to 4. This developer works clear, and, with the proper use of bromide solution as indicated during development, there is no tendency to fog. The mixture here given keeps well, and, when diluted 1 to 4, may be used repeatedly until it works too slowly.

**Glycin.** Although glycin has been in the market some years it has not yet received much attention from amateur or professional workers. It gives negatives with plenty of detail and is peculiarly adapted for giving great density, but is slow in its action. This gives it advantages for "stand development," or for uncertain exposures, and the extremely close, fine grain of its images makes it useful in photo-micrography, and reproduction work. A formula for a two-solution developer is thus given: *No. 1.* Hot water, 10 ounces; add in the order given, sulphite of soda, crystals, 1¼ ounces; carbonate, ¼ ounce; glycin, ½ ounce. *No. 2.* Water, 10 ounces; carbonate of potash, 1¼ ounces. For normal exposures take of No. 1, one ounce; No. 2, two ounces; and add 10 ounces of water. For over-exposure, where known, immerse the plate for two minutes in a one per cent. solution of potassium bromide, and then transfer to the developer as given for normal exposures. For under-exposures take 1 ounce of No. 1, and 2 ounces of No. 2, without dilution. For "stand development," make up the following: Water (hot), 2 ounces; glycin, 20 grains; sulphite of soda, crystals, 50 grains; carbonate of potash, 100 grains. When dissolved, add 18 ounces of water. The plates to be developed, presumably of uncertain but insufficient exposures, are placed in an upright grooved bath and covered with this developer. A normally exposed plate will develop in this mixture in half an hour, from which the reader may estimate when to expect the development of the plates submitted to this treatment. Do not remove the negatives too soon, and after immersing them in the solution, raise each plate in its groove, to insure that no air-bubbles have formed on the film. The negatives given with glycin are of a warm-black color, and possess a good range of gradation with clear shadows.

**Eikonogen.** When eikonogen was first introduced, in 1889, it instantly sprang into wide popularity because of its capacity for giving detail and softness even with under-exposures. But people soon complained of the difficulty of securing density, and that it was not easy to make up into solution. It is, however, an excellent developer in very many ways, and deserves more attention than it has received of late years. It is now most generally used with a density-giving agent such as hydroquinone, which will give the "snap" or contrast desired, but not easy to obtain with eikonogen alone. It is advised to prepare eikonogen solutions with boiling water. The preservative is usually sulphite of soda, and this must be of good quality. Carbonate of potash seems to be the alkali most commonly used, but carbonate of soda is efficient, although less vigorous in action. A good single-solution developer is made up as follows:

Sodium sulphite, crystals, 3 ounces; potassium carbonate, 1¼ ounces; eikonogen, ¾ ounce; boiling water, 25 ounces. Solution is hastened by stirring with a glass rod, or shaking, and the mixture is preferably bottled in 5-ounce bottles, and tightly corked as quickly as possible after preparation. For normal exposures this developer may be used undiluted; but where over-exposure is known, old, used developer is preferred, strengthened as development proceeds with fresh solution and a few drops of bromide solution. Bromide has a more marked action with eikonogen than with some other developers, and should be used with caution until its effects are understood by experience.

**Eikonogen-Hydroquinone.** By combining eikonogen and hydroquinone we secure a remarkably useful developer for general purposes, and one capable of almost as much modification as pyro. The four plates used to illustrate the relation between exposure and development in this number were developed with eikonogen-hydroquinone, the formula being as follows (Heckroth): *No. 1.* Water, 16 ounces; sulphite of soda, crystals, 1 ounce; dissolve and make *just* acid by adding a few drops of sulphuric acid until the solution will turn blue litmus paper red; then add hydroquinone, 80 grains, eikonogen, 80 grains. *No. 2.* Water, 16 ounces; sulphite of soda, crystals, ½ ounce; carbonate of potash, 2 ounces. For normal exposures, take of *No. 1*, 3 ounces; of *No. 2*, 2 ounces; and add water, 1 ounce. Do not add the water during the winter months, but instead add 8 drops of a ten per cent. solution of potassium bromide. This formula, by the way, is calculated for Cramer's *Crown* plates, which were used in making these illustrations, and the proportion of alkali given is as large an amount as these plates will bear without fogging. For correcting the under-exposed negative in PLATE II., equal parts of *No. 1* and *No. 2* were freshly mixed just before development, and used without the addition of bromide. For correcting the over-exposed negative in PLATE III., old used normal developer was taken, and ½ dram of bromide solution was added to the 5 ounces of developer. The effect of this normal developer, mixed without the addition of bromide, as the negatives were made in December, on three different exposures on one plate, is seen in PLATE IV. The effects produced by correct exposure, and under, correct, and over-development with a developer made up of equal parts of *No. 1* and *No. 2*, are seen in PLATE I. By examining these illustrations, which, however, are not as convincing as the original negatives, we see that it is possible to vary the exposure from 1 to 9 seconds (3 seconds being correct), and by judicious development secure a good negative from almost every exposure. The time of development, and, of course, the time required to get a print, varies proportionately to the differences in the exposures. The influence of the time of development, with a correct exposure, is graphically shown in PLATE I.

**Rodinal.** Among the single-solution developers available, rodinal is deservedly the most popular, as it is most efficient. It is a concentrated solution of an alkaline salt of paramidophenol, and requires only the addition of water for use. It produces clear black and white negatives, with abundance of detail, but requires pushing to give density. For normal exposures 1 part of rodinal is diluted with 20 parts of water; for over-exposure, take rodinal, 1 part with water, 10 to 20 parts, and a liberal dose of a ten per cent. solution of bromide; for under-exposure, use rodinal, 1 part, and water, 20 to 40 parts, giving development plenty of time and adding a few drops of hydroquinone solution (10 grains in 1 dram of alcohol). Strong solutions of rodinal produce contrasty negatives and *vice versa.* For uncertain exposures, it is advised to begin development with rodinal, 1 part; water, 25 parts, and, when the character of the exposure is indicated, to transfer the plate to a rodinal solution of the strength required. Plates which of themselves tend to give contrasty negatives require a more diluted solution of rodinal than plates naturally inclined to yield soft negatives. Negatives developed with rodinal are apt to lose strength in the fixing bath, hence development should not be stopped until sufficient density is secured to allow for this.

**Diphenal.** This is a concentrated solution of diamidooxydiphenyl, and, like rodinal, simply requires the addition of water to make a developer ready for use. It is especially advised in cases of over-exposure, having little or no tendency to fog, and not requiring the use of bromide. When treated with diphenal, 1 part, diluted with water, 20 parts, a normally exposed plate will be developed in ten minutes. In the case of under-exposed plates a few drops of a ten per cent. solution of caustic soda will accelerate the appearance of the image, and development may continue for half an hour without fear of fogging the shadows.

**Tolidol.** This is a comparatively new developer, of American origin and manufacture; of its composition I can offer no information, but of its efficiency many high authorities have spoken with much praise. It comes as a gray pearly powder, dissolves readily in cold water, does not stain fingers or plate, and may be used repeatedly. It requires smaller quantities of sulphite and alkalies than some of its rivals, and is an economical developer, *i.e.*, 1 ounce of tolidol will make quite 3 gallons of developer. It is obtainable in three forms: the agent tolidol for admixture with sulphite and alkali; the developer in powder form forming a standard developer when made up in solution; and separately prepared, ready for solution, to suit all the various brands of plates in the market. The standard formula for plates and films is as follows: Water, 16 ounces; tolidol, 24 grains; sodium sulphite (C. P. dry), 72 grains, *or* "crystals," 144 grains; sodium carbonate (C. P. dry), 96 grains, *or* "crystals," 240 grains. Its action is rapid, but controllable with bromide, and it gives negatives of a deep graphite color. The color of the negative can be altered by adjusting the alkalies. I have used tolidol considerably with both plates and paper; it is wonderfully flexible, and to enter fully into its modifications for various uses would require a book in itself. Such a book the manufacturers of the developer have prepared (too full of detail for condensation) and it should be seen by those interested.

**Hydramine.** This also is one of the more recent developers. Bothamley exploits it as a new introduction by Lumière and Seyewetz, but the sample I have used (with much satisfaction) came from Chavant & Co., from whom I learn that it is an American product, as is metacarbol, received from the same firm. Hydramine comes in the form of gray leaflets, with a peculiar pearly lustre and, in combination with weak solutions of the caustic alkalies, gives a powerful developer which, even in diluted solutions, may be used repeatedly. Its action is very gradual, and it is abnormally sensitive to the bromide solution; these qualities make it a useful agent for the development of all kinds of exposures, in other words, for all around work. It does not stain the fingers and keeps well in solution. To prepare a normal developer take: Water, 32 ounces; hydramine, 70 grains; sulphite of soda (dry), ½ ounce; caustic soda, 100 grains. If desired, 45 grains of caustic lithia may be used in place of the 100 grains of caustic soda advised, but I have not found this advantageous. Dissolve the caustic soda and sulphite first, then add the hydramine, and shake or stir the mixture until solution is complete, when it may be filtered or used as it is. Under-exposure is corrected by adding a few drops of a five per cent. solution of caustic soda; in case of over-exposure development may be controlled by adding bromide (ten per cent. solution) *up to* 15 minims for every 4 ounces of developer used.

**Metacarbol.** This, like hydramine, belongs to the class of reducing agents which form energetic developers in combination with weak solutions of caustic alkalies. It has for its characteristics, great rapidity of the appearance of the image and softness of effect; there is no fear of fog even when development is abnormally prolonged, and density is largely influenced by the time of development.

With normal exposure metacarbol yields a soft, but brilliant image, and bromide is unnecessary unless the plate has been considerably exposed. The developer advised is as follows: *No. 1.* Water, 16 ounces; bisulphite of soda, ¼ ounce; metacarbol, 1 ounce. *No. 2.* Caustic soda, 2 ounces; sulphite of soda, crystals, 4 ounces; water *to make* 16 ounces. For use, take ½ ounce of *No. 1;* ½ ounce of *No. 2*, and add 4 ounces of water. With a correct exposure this mixture will complete development in about four minutes. As with many developers, metacarbol gives the image quickly, and the plate must be kept in the solution until the details seem to be almost buried, the density disappearing to a certain extent in fixing. The diluted developer, well bottled and mixed with a little fresh developer, may be used repeatedly. A convenient single-solution developer is made up as follows: Dissolve in 10 ounces of hot water ½ ounce of metacarbol, and 1 ounce of caustic soda; when complete solution is obtained, add 2 ounces of sodium sulphite, and 40 ounces of water. For use, take 1 ounce of this and dilute with 2½ ounces of water. By further dilution or less water this developer may be suited to any plate or any exposure.

**Pyrocatechin Elconal. Elconal F.** The developing agent now sold under this name is an improved form of the pyrocatechin introduced almost twenty years ago. It comes now from the firm of Ellon and Co., in three forms, (1) the developing agent pyrocatechin alone; (2) as *Elconal*, a two-solution concentrated mixture of pyrocatechin with soda in water; and (3) as *Elconal F*, a two-solution mixture of the pyrocatechin-soda developer with hypo-soda (or fixing salt) by which simultaneous development and fixing are accomplished.

Pyrocatechin is a white crystalline substance, readily soluble in water, and gives with caustic soda an energetic developer, which keeps well without discoloration, does not stain the fingers, and has little tendency to fog even when development is prolonged. It may be used repeatedly, and gives black-gray images with clear shadows. Being sensitive to the addition of bromide, it offers considerable latitude in exposure. A good formula, given by Vogel and Hanneke is: *No. 1.* Sulphite of soda, crystals, 385 grains; pyrocatechin, 80 grains; water *to make* 10 ounces. *No. 2.* Phosphate of soda, ordinary crystallized, 1½ ounces; caustic soda, 80 grains; water *to make* 10 ounces. For normal exposures, take 1 ounce of *No. 1;* 1 ounce of *No. 2,* and from 1 to 3 ounces of water. Over-exposure is controlled by the addition of bromide, ten per cent. solution.

A concentrated single-solution developer is given by Vogel. Dissolve in the following order. Sulphite of soda, crystals, 3½ ounces; caustic soda, 216 grains, thoroughly dissolved in 14 ounces of water; then add pyrocatechin, 308 grains. This should be bottled and well corked. For use, take 2 drams of this concentrated solution and dilute with 4 ounces of water; with less dilution the developer is more energetic and gives stronger contrasts; with greater dilution it works more slowly and gives soft effects. Bromide is unnecessary with this mixture, save when working with plates inclined to fog.

With Elconal F, as a preparation for simultaneous development and fixation I had not had sufficient experience to enable me to give an opinion. The six test plates which cover my experience with it yielded five negatives full of detail, pinkish-gray in color, with slightly veiled shadows, and lacking in density although immersed in the solution, made according to the maker's formula, for from five to twenty-five minutes. Two plates exhibit green fog, and another shows, by reflected light, an attractive positive image on the film.

**Kachin.** This is a developer obtainable, as far as my information goes, only in Great Britain. It is generally supposed to be either identical with or a modified form of pyrocatechin, and similarly permits of the addition of hypo-soda to effect simultaneous development and fixing of the exposed plate. The claims put forward for kachin, and its working formulæ, are identical with those furnished for Ellon's pyrocatechin, and need not, therefore, be repeated here.

**Diamido-Resorcin.** This is, perhaps, the latest of developing agents in order of commercial introduction, but does not call for extended notice. It is a benzene derivative, closely analogous to amidol, and comes in the form of small yellow leaflets, soluble in water. The character of the negative it yields is almost the same as that given by amidol, and Bothamley, after a full account of his experiments with it, dismisses it with the assertion that "it does not seem to have any advantages over amidol for photographic purposes."

**Imogen.** Introduced in 1899, Imogen is a patented developer, the composition of which is not published. It comes as a light-gray powder, more readily soluble in hot water than in cold, is not suitable for use with the caustic alkalies, but forms an energetic developer with the carbonates of soda and potash, the former being preferable. It is said to be especially adapted for the development of extremely rapid plates, but my tests with it on Cramer *Crown* and Lovell *Extra Rapid* do not show it to possess any advantage in this respect over eikonogen and metol. The image appears quickly and density requires pushing. The following formula will give good results with an approximately correct exposure: *No. 1.* Water, hot, 9 ounces; sulphite of soda, crystals, 385 grains; imogen, 123 grains. *No. 2.* Water, hot, 4½ ounces; carbonate of soda, 2 ounces. Let the solutions become cold. For use, take 2 ounces *No. 1*, and 1 ounce of *No. 2*. Bromide should be added in small quantities only. For under-exposure dilute the above mixture with 2 ounces of water; for over-exposure old, used developer will be found advantageous, with ½ ounce of *No. 2* and 10 drops of bromide solution.

**Diogen.** This also is a patented developer but none the less acceptable. It has the quality of elasticity in a greater degree than any other developer with which I am acquainted, its action being slow but very certain, yielding wellmodulated negatives of a black color similar to those developed with glycin. As a developer diogen is usually prepared in the form of a concentrated solution thus: Water, 9 ounces; sodium sulphite, 3½ ounces; 7 drams of diogen; and 4½ ounces of potassium carbonate. The solution is filtered and kept in filled, well-corked bottles. For a normal exposure take 4 drams of this solution; dilute with 2 ounces, 1 dram of water; and add 2 drops of bromide solution 1 : 10. In case of over-exposure reduce the quantity of water, and increase the amount of bromide solution from 2 drops to 1½ drams per 3 ounces of developer according to the requirement of the negative, adding the bromide, of course, a few drops at a time until it is seen that sufficient has been added. For under-exposure increase the amount of water, and let the plate remain in the diluted solution until developed. As a test solution, to ascertain whether an unknown exposure is under, correctly, or over-timed, regardless of the developer to be used in its development, diogen is very useful. Thus we place our plate in the following solution: Diogen concentrated solution, 85 minims; water, 3½ ounces; potassium bromide solution, ten per cent., 2 drops; and bring the bath up to 68° Fahr. If the image comes up at the end of four minutes it is correctly exposed; if under four minutes it is over-exposed; if longer than four minutes it is under-exposed. After testing, rinse well in water, and then proceed to develop the plate in a normal developer, diogen as above or any other developer we may prefer, except one containing ammonia.

Here we must make an end to our survey of developers and development. It is already too lengthy, I fear, to have held the reader's interest, and yet we have got but the barest introduction to the subject. The question of development according to subject, *e.g.*, in photographing flowers, is fully dealt with in the general treatment of such subjects. Thus development in lantern-slide making is dealt with in THE PHOTO MINIATURE, No. 9. The investigations of Hurter and Driffield, of Watkins, and others, which have an important place in the literature and practice of negative-making have not even been mentioned, and more has been left out than has been put in if all were told. Perhaps we may return to the subject again, and this little book will then form the first step toward a higher footing at the next attempt. Acknowledgment is here made of the valuable help given by Mr. Ernest Heckroth of Philadelphia, who made the negatives utilized in the four plates given on other pages; and of a great deal of useful information gleaned from the scattered papers on development contributed to various journals by Professor Charles H. Bothamley.

## BOOKS.

*Development, Including Instructions for the Use of Eikonogen, and a Comparison of Developers.* By Lyonel Clark. 48 pp. Republished in 1896 from the *Amateur Photographer.* London. 50 cents.

*Modern Developers and How to Use Them.* By E. Ardron. 56 pp. Republished in 1894 from *Photography.* London. 25 cents.

*Developers: Their Use and Abuse.* By Richard Penlake. 64 pp. 2d edition. 1896. 25 cents.

*The Development of Gelatine Dry Plates.* By Rev. W. H. Burbank. 91 pp. 1890. Now out of print and unobtainable.

*A Reference Book of Practical Photography.* By F. Dundas Todd. Part II. Chiefly devoted to developers and dark-room manipulation. 122 pp. 1899. 50 cents.

Among the general manuals, such as Abney's *Treatise* and Brothers' *Photography* may be found chapters on developers and development adapted for more advanced readers. Perhaps the most prolific source of information on the subject, however, is *Photography Annual,* an English year-book wherein, for several years past, Bothamley has briefly recorded each year's work in chemistry and kindred subjects applied to photography.

# NOTES.

The March number of THE PHOTO-MINIATURE—the last number of Volume I.—is now in press, and will be ready for delivery in a few days. It deals with *Retouching Negatives and Prints*, and its illustrations will be, as the critic desired, "germane to the subject." There has long been a demand for a little book of common-sense about retouching, and we believe that the next number of THE PHOTO-MINIATURE will satisfy this demand. Closely following the number on retouching, our second volume will open with a peculiarly interesting and specially illustrated little book telling all about *Photographing Flowers and Trees*. After that—well, we have to be patient, and so must other folk. A number of attractive subjects are in hand!

Several reprints are ready, as follows: Third editions of No. 1: *Modern Lenses*, and No. 2: *The Pose in Portraiture* (8th thousand of each); Second editions of No. 4: *Photography Outdoors* (7th thousand), and No. 6: *Orthochromatic Photography* (8th thousand).

◆

A friend suggests that when we said in our last issue:—"We have made several attempts to secure such outside help as will enable us to publish the magazine more promptly, but without complete success," the paragraph read as though we were in need of financial assistance! It is needless to say that no such meaning was intended in the paragraph. THE PHOTO-MINIATURE fortunately needs no financial assistance from outside—excepting, of course, the "assistance" we get from "straight business deals." The help we referred to concerned the preparation of the magazine, the getting together, in other words, of a sufficient quantity of the right sort of information. To quote the New York *Sun*: "If our friends who favor us with manuscripts for publication wish to have rejected articles returned, they must in all cases send stamps for that purpose." This may not read encouragingly, but it "fits the crime." Manuscripts submitted should contain not less than 15,000 words.

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*Philadelphia Photographic Salon, 1900.* The Pennsylvania Academy of the Fine Arts has the honor to announce that under joint management with the Photographic Society of Philadelphia, the *Philadelphia Photographic Salon* for 1900 (third year), will be held at the Galleries of the Academy, from October 21st to November 18th next.

The aim of the *Salon* is to show only such pictures produced by photography as may give distinct evidence of individual artistic feeling and execution, rigidly selected by a competent jury, the honor of acceptance being the only award.

All those interested in the purpose of the *Salon* are invited to give it their cordial support and encouragement, both by submitting specimens of their work and by making it favorably known to others.

This preliminary notice will be followed in due course by a full circular giving all details. Meanwhile those interested should communicate with Mr. Robert S. Redfield, Mr. John G. Bullock, or Mr. Edmund Stirling, of the Photographic Society of Philadelphia, 10 South 18th Street, Philadelphia.

◆

That bright little magazine *Western Camera Notes*, published at Minneapolis, Minn., by C. F. Potter, Jr., at the ridiculous price of sixty cents yearly, has doubled the number of its pages, and continues to improve in many ways. The paper on which the last issue is printed is altogether preferable to the extremely glossy paper used in previous numbers.

◆

Mr. Frederic E. Ives sends us a bundle of interesting information concerning the progress of Kromskop Color Photography, with announcements of several new styles of *Kromskops*, a list of *Kromograms* now available, and particulars of the *Ives Orthochromatic* and *Tri-chromatic color screens.* A request addressed to the *Kromskop Company*, 1324 Chestnut Street, Philadelphia, mentioning THE PHOTO-MINIATURE, will be sufficient to bring copies of these to any reader desirous of the information they give.

◆

The Eastman Kodak Company informs us that *Kodaks* will be admitted to the grounds of the Paris Exposition

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free of charge, and can be used throughout the day. Tripod cameras will be allowed within the Exposition grounds only until 1 P.M. daily, on presentation of a written permit which must be obtained from the Commissioner General and must be paid for. These tickets of admission will cost 25 francs per day for each piece of apparatus. Season tickets will be issued for tripod cameras, on which must appear a photograph of the person receiving them, the charge for this season ticket being 1,000 francs. The moral is obvious: take a kodak or a hand-camera with you.

No exhibited article or display at the Exposition may be photographed without the written permission of the exhibitor, and interference with sightseers will not be permitted. The full text of the regulations governing photography at the great Exposition may be obtained at the office of the Minister of Commerce, Post Office and Telegraphs of France, in Paris.

❧

One of the daintiest camera *brochures* of the new season is that just issued by Hirsch and Kaiser, 7 Kearney Street, San Francisco, California. It concerns "Springtime, the Camera-Man, and the Season's New Styles" in outdoor apparatus, and is worth seeing.

❧

The Chicago Salon, held at the Institute of Arts during April, was a thoroughly interesting and successful exhibition, especially strong in Western work. About 168 prints were admitted to the walls, and the proportion of professional work was unusually large. May we suggest to the authorities that they open their publicity bureau a little wider next year, and keep the photographic press informed *after* as well as *before* the event.

❧

*Wilson's Photographic Magazine*, always helpful and interesting in its reading matter and illustrations, has latterly been unusually attractive. It is, in our opinion, emphatically the best of American photographic magazines for the professional worker, and the advanced amateur will find its pages equally profitable from his point of view. (Edward L. Wilson, 289 Fourth Ave., New York.)

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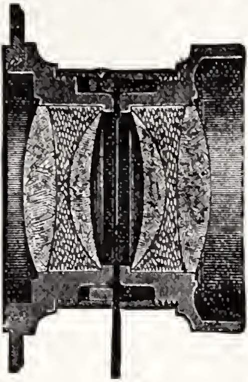

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The amateurs of Sioux City, Iowa, have formed a Camera Club, beginning with over twenty members, which number has doubtless, by this time, been largely increased. E. R. Kline is the president, and D. B. Henderson is the secretary of the new club, which has our cordial good-will. Secretaries of other clubs willing to arrange exchanges of lantern-slide sets, papers, etc., are asked to communicate with Mr. Henderson as early as possible.

◆

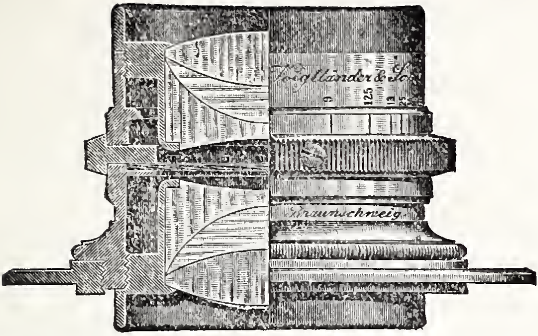
Mr. Edward W. Newcomb asks us to state that he has resigned the editorship of *The Photo-American*, and is no longer connected with that paper. It is his intention to publish a new photographic journal, in which adventure we are sure that he will have the cordial goodwill of all who have admired his bright work in *The Photo-American.*

◆

The use of ammonium persulphate as a selective reducing agent for negatives continues to receive considerable attention. American workers frequently complain that their trials of the new agent have not been wholly successful, and wide variations in its action and results are reported. Much of this trouble undoubtedly arises from the fact that the salt sold as persulphate when it was first brought forward was simply sulphate, which is inert as far as reducing power is concerned. On this account it is interesting to know that the genuine Lumière ammonium persulphate may be obtained from William C. Cullen, 61 William Street, New York, or in England, from Fuerst Bros., 17 Philpot Lane, London, E.

◆

Concerning the use of a hypo bath after the reduction of a negative with persulphate, referred to in our last issue, our trials based on the suggestion there mentioned show that unless the reduced negative is well washed after immersion in the sulphite bath, there is a tendency on the part of the hypo bath to still further reduce and weaken the image. Negatives well washed between the sulphite and hypo baths did not exhibit this tendency. In any event the suggestion that a hypo bath was desirable, was only intended to apply when the action of the persulphate had left a pink stain in the reduced image, and its use under ordinary conditions is unnecessary.



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*Flame, Electricity and the Camera*, Man's Progress from the First Kindling of Fire to the Wireless Telegraph and the Photography of Color. By George Iles. With over a hundred illustrations, including two insets in color. xv. + 393 pp., 6 × 9 in. Cloth, price, $2. New York: Doubleday & McClure Co.

Of this book Professor John Fiske writes: "It is one of the most fascinating books that I have seen in the last ten years." We would like to add that it certainly contains the most fascinating account of the evolution of photography within our knowledge. Mr. Iles shows a thorough knowledge of the ins-and-outs of his subject, and the amount of information given in the hundred pages devoted to photography is as surprising as the freshness of the manner in which he deals with a well-worn theme. The illustrations are well chosen and worthily presented; the typographical appearance of the book is altogether pleasing; and the very full index supplied gives the book permanent value as a work of reference. What more can we say? Mr. Iles has done an excellent work, and we hope that his book will meet with the generous appreciation it deserves.

◆

*Prints in sepia, brown, and red on platinotype paper.* At the February meeting of the Photographic Society of Philadelphia, Mr. Prescott Adamson read an interesting paper on *Platinum Toning*, which he illustrated with several examples of his work in that direction. The paper is given in full in the Society's *Journal* for February—March, from which we reproduce the subjoined digest of it.

The fact that black undeveloped platinotype paper can be toned sepia by simple development is well known, and by various toning methods other colors may be obtained. The sepia tone is obtained by developing in the bath for black paper, to which mercuric chloride has been added. The two solutions needed are, first, the usual platinotype developing salt, dissolved in 50 ounces of water; and second, a solution of 1 part bichloride of mercury in 25 parts of water. One part of this mercury solution is mixed with 8 parts of the developer and the bath is ready. The print is floated and developed in the ordinary way, and then placed in a hydrochloric bath made by diluting the usual bath (1 part

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hydrochloric acid, S.P. 1.16, to 60 parts of water) with 4 parts of water, making a bath of 1 to 300. It has been ascertained by test that after prints had been thrice washed in this strength of acid, all the iron had been removed. Acid baths of the usual strength will cause the tone to rapidly fade out.

Speaking of the obtaining of deeper sepia, brown, and red tones with the uranium bath Mr. Adamson said in substance: This bath is generally used in connection with the mercury toning first described. A black print, however, may be toned to sepia, red, or brown by immersing it in the uranium bath, but the toning is very slow—about an hour. The best way to use the uranium bath is to develop the exposed print in the oxalate developer, to which is added only half the strength of mercury that is used for sepia toning. By this development it acquires a faint sepia, being then washed in the weak acid bath, and afterward in water. It is then toned in the following bath: ten per cent. solution of uranium nitrate, 2 drams; ten per cent. solution ferricyanide of potassium, 2 drams; acetic acid, 1 dram; water, 10 ounces. The tone will go into a deeper sepia, and various tones of brown and red, almost any shade desired, can be obtained, the toning with this bath proceeding fairly rapidly. The hands should *not* be put into these toning solutions, as they are extremely poisonous and attack the skin. One hand, protected by rubber finger-stalls, is sufficient for the work. To reduce a sepia-toned print immerse it in a strong hydrochloric-acid bath; to remove the uranium tone, use a weak solution of sodium carbonate.

❧

*Ferric and Heliographic Processes.* A Hand-book for Photographers, Draughtsmen and Sun Printers. By G. E. Brown. Illustrated in the text, and with six full-page heliographic prints, 130 pp., 5 × 7¼ in. Cl., $1. London: Dawbarn & Ward, Ltd. New York: Tennant & Ward.

Since Lietze's standard work on the heliographic processes went "out-of-print," there has been a steady demand for a manual dealing with these sun-printing methods, which are largely used by engineers, draughtsmen, etc. Mr. Brown's little hand-book meets this need

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in a very practical way, and is an acceptable addition to the scanty literature of its subject. Readers of THE PHOTO-MINIATURE will find in its pages much information helpfully supplementing the monograph given in our last number. The specimen heliographic prints given throughout the volume are good examples of the processes described.

◆

Readers of THE PHOTO-MINIATURE desiring to see a camera catalogue *de luxe* should write to the Eastman Kodak Co., Rochester, N. Y., for a copy of the 1900 list, entitled *The Witchery of Kodakery.* Upon the making of this dainty catalogue Mr. L. B. Jones, the advertising expert of the Eastman firm, has spent the concentrated genius of years—with worthy results. The text is cleverly written, full, simple, and interesting in its information; the illustrations are "from life" and illustrate the matter they accompany "as perfect music set to perfect words." It is safe to say that, with this catalogue abroad, the *Kodak* in one form or another will easily dominate the hand-camera market. But get the book, and see for yourself.

◆

*A Guide to Plain Penmanship.* By F. Dundas Todd, 30 pp., illustrated, 5¼ × 7½ in. Paper covers, 25 cents. Chicago: The Photo-Beacon Co. Until the happy day arrives when babes shall be born into this world with typewriter attachments the man who provides "a guide to plain penmanship" must be hailed as a benefactor of the race. Mr. Todd has done his work well, and his little book is all that it purports to be. May it have as large a sale as it deserves.

◆

The *Convertible Ampliscopes* announced by Mr. U. Nehring, New York, are designed to meet a need experienced by every hand-camerist, increasing the scope of his lens in a remarkable way, and at a very moderate price. The set includes supplementary lenses, readily attachable to the ordinary rapid rectilinear lens, converting the instrument into (1) a copying and enlarging lens, (2) a wide-angle lens, (3) a portrait lens, and (4) a tele-photo lens. With these is also provided an ortho-

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❧

*Bird-Lore*, for April, contains an illustrated description of a new camera for bird photographers, by John Rowley, of the American Museum of Natural History, New York. The camera, in some few features, resembles the new *Reflex* hand-camera, and provides for the use of a 10-inch lens with a plate 5 × 7 inches.

❧

Burke & James, of Chicago, have just placed on the market *Automatic Developing and Fixing Powders* in a form which should lead to their popularity with amateurs. The convenience of being able to develop and fix plates or films in one operation is one which will be widely appreciated, as doing away with fully half the labor required to make negatives from exposed plates. The powders are so regulated that the development of the negative is completed before the fixing agent begins its work. We hope to give these powders a practical test, and will then report further. Meanwhile those who desire to experiment for themselves can obtain a sample box of powders from Messrs. Burke & James for the nominal price of 50 cents.

❧

The *Premo* catalogue for 1900, obtainable on request from the Rochester Optical Co., Rochester, N. Y., contains not only particulars of the new styles of this popular camera, as prepared for the season of 1900, but also a rich variety of fine illustrations showing the work of the *Premo* in all branches of photography.

❧

*The "Camera Notes" Improved Glycerine Process* for the Development of Platinum Prints, including a very full account of the experiments by Joseph T. Keiley and Alfred Stieglitz, and illustrated by fac-simile reproductions of eight prints by the experimenters. 12 pp., 7¾ × 11¼ in. Price, $1 net. Tennant & Ward, New York. This monograph has been reprinted, with the original illustrations, from No. 4, Vol. III., of "Camera Notes,"

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to meet the demand for reliable information concerning the glycerine method of developing platinotypes, and the obtaining of color by modifications in development. It comprises the most important addition to the literature of platinum printing since the first introduction of the "cold bath" process, and should not be overlooked by those interested in the platinotype and its variations. The edition is limited to 500 copies, of which a large proportion has already been taken up.

❧

The March one-man exhibition at the New York Camera Club was devoted to a selected collection from the works of Mr. Joseph T. Keiley, especially designed to show his work with the glycerine method above mentioned. As proof of the wonderful possibilities of controlling the character of a platinum print by the skilful use of glycerine and the brush, the exhibition was of surpassing interest, and apart from this point of view, many of the prints possessed rare beauty as examples of pictorial photography.

❧

*The Process Photogram*, Vol. 6, 1899, comes to our table, a substantial book, well bound in gray-cloth boards with the familiar band of blue across its covers. The vast amount of information in its six hundred pages, as well as the variety of its illustrations, make us wonder how the magazine can be "made to pay" at $2 per year. *The Photogram* alone (without the "Process edition") may be had for $1.10 per year, and in this form has already a large circulation in America. It deserves, however, to be more widely known, and we suggest the sending of ten cents to the American Agents, Spon & Chamberlain, Cortlandt Street, New York, for a specimen copy.

❧

The Lovell Dry Plate Mfg. Co., New Rochelle, N. Y., inform us that, by recent improvements in the manufacture of their plate, the *Lovell Plate* is now fully as rapid as any in the market, and that this increased rapidity has resulted in a considerable increase of business since the year began. An orthochromatic plate and a backed (non-halation) plate are promised in time for the

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| 4 | 7½ | 5 x 4 | 6½ x 4¾ | 7½ x 5 | 37 |
| 5 | 9 | 6½ x 4¾ | 7½ x 5 | 8½ x 6½ | 45 |
| 6 | 11 | 7½ x 5 | 8½ x 6½ | 9 x 7 | 60 |
| 7 | 13 | 8½ x 6½ | 9 x 7 | 10 x 8 | 77 |
| 8 | 15 | 10 x 8 | 12 x 10 | 13 x 11 | 102 |
| 9 | 18 | 12 x 10 | 13 x 11 | 15 x 12 | 135 |
| 10 | 21 | 13 x 11 | 15 x 12 | 18 x 16 | 180 |
| 11 | 24 | 15 x 12 | 18 x 16 | 22 x 18 | 232 |

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season just opening. We have had a great deal of satisfaction in our use of the *Lovell Plate* for many years past, and have no hesitation in endorsing the claims made for it by its makers.

❧

Messrs. Ross, Ltd., of London, have furnished us with a few copies of their latest catalogue of lenses, anastigmats, etc., for the convenience of our readers, and we will be glad to enclose a copy for those who do not find it convenient to write to England for information about the Ross lenses.

❧

The Pittsburg Amateur Photographers' Society announces the third annual *International Salon and Exhibition*, to be held at the Carnegie Art Galleries, Pittsburg, Pa., from May 17th to 31st. Unfortunately the announcement reaches us too late to be of service in inviting our readers to participate, as all exhibits must be delivered before May 1st. Mr. Joseph H. Hunter, care of Carnegie Art Galleries, Pittsburg, is the secretary of the *Salon* committee.

❧

*National Photo News and Views* is the title of the latest venture in the field of photographic journalism. It is published by Lawyer & Wagner of Washington, D. C., at fifty cents per year, and is announced as "the official organ of 3 camera clubs; 4 universities; 12 colleges; 3 young ladies' institutes; 2 young ladies' colleges; 7 high schools; and three military institutes." We congratulate the youngster on its "backing" and hope it will survive.

❧

The February *Special Wall Display* of the Photographic Society of Philadelphia was an exhibition of works by Mrs. Gertrude Käsebier, of New York; and the April *Display* covered the work of Mr. C. Yarnall Abbott, of Philadelphia. Both exhibitions were of surpassing interest and were warmly appreciated by all who saw them. It would seem altogether desirable that these special collections should be shown at all the principal camera clubs of the country, and we believe that an immeasurable amount of good would result from the publicity the work would thus receive.

ART CATALOGUE

POST FREE

*St. Veronica:* A Journal of Photography. Edited and published by George Ewing, Calcutta. 32 pp., monthly, illustrated. 7 × 10½ in. Subscription, Rs. 6, yearly.

We have to thank Mr. George Ewing for a complete file of this very interesting journal, beginning with the first number, issued January, 1898. It has given us a fairly complete review of photographic life in India, and contains several valuable treatises (continued from one issue to another) on photographic work, written by men who are authorities in their special fields. Thus Dr. Miethe writes on "Photographic Optics;" Professor Namias on "Photographic Chemistry;" Colonel Pizzighelli on "Platinum Printing" and "Stereoscopic Photography;" and Il Pipistrello on "The Compleat Photographer." The editor's notes "Before the Footlights" are delightfully *piquant* in their comments on "the quick and the dead," and, taken as a whole, *St. Veronica* is one of the liveliest and most useful of photographic journals.

❧

President S. L. Stein, of the Photographers' Copyright League, has issued a letter calling attention to the work of the League in behalf of photographic copyright, and asking the support and financial help of all interested. Applications for membership in the League, and contributions toward its propaganda should be sent to the Secretary, Mr. C. E. Bolles, 244 Fulton Street, Brooklyn, N. Y. We would again urge the readers of THE PHOTO-MINIATURE to interest themselves in this good work, which is wholly for their benefit, and to support the League by their personal adhesion.

❧

*Concerning Developers.* A useful handbook on *Patent Photographic Developeres and Agfa-Intensifier* has just been issued, for free distribution, by the Actien-Gesellschaft für Anilin-Fabrikation, of Berlin. It contains full working instructions for many of the developers mentioned on other pages of this number, and deserves a place among the photographer's reference books. Copies may be obtained on request from Messrs. E. & H. T. Anthony & Co. or George Murphy, New York, or any of the larger dealers.

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controlled in America by G. Gennert, New York. The little book on *Developers* obtainable on request from Mr. Gennert is a worthy companion to the above.

Ellon's pyrocatechin, elconal, and elconal F, manufactured by Dr. Ludwig Ellon & Co., of Charlottenberg, Germany, are obtainable from the Scovill & Adams Company, New York. The possibilities of these three developers, and especially the last named, are worth looking into.

A second and revised edition of *Tolidol Talks* is promised, to be ready shortly, by the Haller-Kemper Company, of Chicago. The first edition was cyclopædic in the fulness of its information, and formed a very satisfactory guide in negative manipulation. The booklet is "free for the asking."

Pure chemicals make a wonderful difference in the amount of pleasure and profit one gets out of photography, and, fortunately, the American market provides a big choice of high-grade specialties in this line. It is worth noting, however, that the brand "M.C.W." (Mallinckrodt Chemical Works, St. Louis) guarantees the standard quality of all the photographic specialties on which it may be found.

◆

The Haller-Kemper Co., of Chicago, are placing in the market two very convenient combination boxes comprising separate outfits for negative making and printing. No. 1. *The Tolidol Outfit* contains developers for plates, films, and papers, a tube of restrainer, a box of acid hypo fixing powder, and tubes of "hypofoe" and intensifier. No. 2. *The Sensitol Outfit* contains everything necessary for the making of sensitol prints on postal cards, letters, linen, cotton, leather, etc., and a sample print. Apart from the convenience of these outfits, a feature is made of the purity and quality of the specialties offered. In this way the combinations are intended to serve as introductions to the many excellent specialties manufactured by the Haller-Kemper Co. for amateur and professional photographers. We use these specialties largely in our experimental work, and can recommend them with confidence to our readers. We are advised that Messrs. Haller-Kemper have now branch depots at St. Paul, Minn., and at 150 Fifth Avenue, New York, for the convenience of their customers in the east and northwest.

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A photographic exhibition of selected examples of professional and amateur work is to be held at Frankfort, Germany, in July next, under the auspices of the local Association for the Promotion of Photography and Kindred Arts. Exhibits from America are specially invited. Correspondence should be addressed to Th. Haake, care of Haake and Albers, Frankfort on the Main, Germany.

◆

*The Photographic Dealer's Annual*, 1900. A complete guide to photographic dealing. Edited by Arthur C. Brookes. cxiv + 96 pp. Illustrated. 7½ × 10 in. Published for the trade only. London: Marshall & Brookes.

This year-book aims to supply the English photographic dealer with a practical reference-book such as the amateur photographer finds in his British Journal Almanac. Its contributed articles concern various ways of securing business, choice of apparatus, the care of photographic stock, etc. Useful lists of telegraphic addresses, photographic societies, and the like help to complete a volume which the progressive British dealer will find an indispensable aid in his work.

◆

Mr. C. P. Goerz, 52 Union Square, New York, the manufacturer of the popular *Double Anastigmat*, informs us that he has established a factory at Yonkers, N. Y., in order to enable him to more promptly meet the growing demand for the anastigmat.

◆

*The Camera* (F. V. Chambers, 16 South Fifth Street, Philadelphia) is now making a feature of original matter, and, with this improvement, is tenfold more interesting than of yore. The size of the magazine has also been increased and, in its present form, it is a remarkable five cents' worth.

◆

Supplementing the information regarding *Kallitypy* given in our last number, the following new modification of Nicol's process may be interesting. It comes from M. Van Loo, of Brussels, under the name *Simile-Platine Paper*.

The sensitizing solution is composed of: Ferric oxa-

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late, 15 parts; oxalic acid, 3 parts; silver nitrate, 3 parts; water, 100 parts. This quantity is sufficient to sensitize a dozen sheets of paper 50 × 60 cm. The paper is printed exactly like platinotype—that is, till the image is distinctly visible only, and it is then developed by immersion in: Borax, 60 parts; sodium tartrate, 60 parts; water, 1000 parts. To increase contrast and obtain pure whites, a few drops of a five per cent. solution of potassium bichromate should be added to the above. After development, which takes five or six minutes, the print should be well washed in running water, and then toned in: Potassium chloro-platinite, 1 part; citric acid, 10 parts; salt, 10 parts; water, 1000 parts, till the desired tone is obtained, and the print should then be immersed for five minutes in a two per cent. solution of ammonia, and washed.

❧

Messrs. E. & H. T. Anthony & Co. advise us of their removal from 591 Broadway to 122–124 Fifth Avenue, between 17th and 18th Streets, New York. The new quarters occupy the entire second floor of the Mercantile Building, and are fitted with all the conveniences of the modern business building. The location is altogether admirable for its purpose, and we offer our congratulations to Messrs. Anthony & Co. upon this timely move.

The house of E. & H. T. Anthony & Co. is perhaps more widely known than any other firm connected with photography in America. It was established almost sixty years ago when the Daguerreotype process was first made known, and so wisely and skilfully have its vast interests been managed, that it remains to-day the most enterprising, as well as the largest, of American photographic stock-houses.

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Now and then, especially in winter, the amateur wishes to make from two to half a dozen pictures, but does not care to use up an entire spool of a dozen exposures before development. To provide for this we have now prepared to furnish daylight loading cartridges for two or for six exposures. For work at home, then, as well as for one's outings, the Kodak becomes more convenient than the plate camera. No dark room except for development, no bothersome plate-holders or dark slides.

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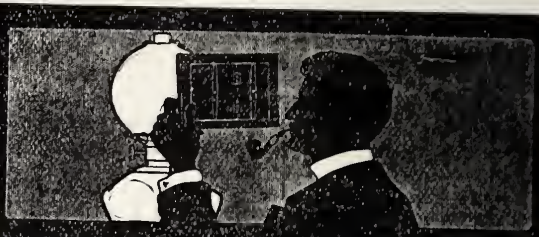

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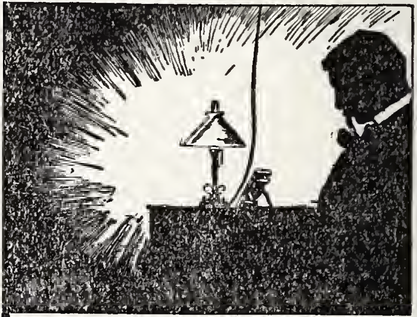

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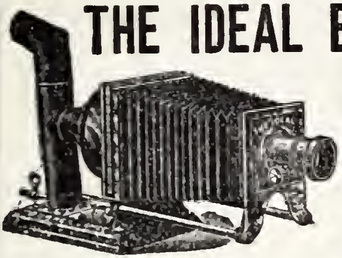

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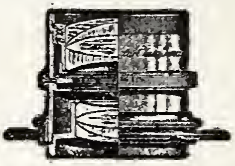

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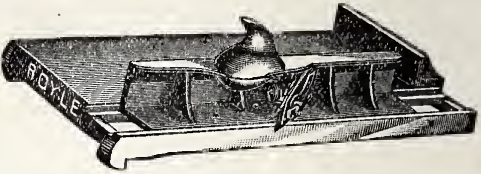

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289 FOURTH AVENUE, NEW YORK

LONDON : DAWBARN & WARD, LTD.

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## VOLUME I

APRIL, 1899—MARCH, 1900

NEW YORK
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## *PUBLISHERS' NOTE*

*No. 1, "Modern Lenses," first issued March 28, 1899, was reprinted in July, 1899; and again reprinted in April, 1900. No. 2, "The Pose in Portraiture," first issued in May, 1899, was reprinted in August, 1899; and again reprinted in April, 1900. No. 3, "Hand-Camera Work," first issued in June, 1899, was reprinted in January, 1900. No. 4, "Photography Out-doors," first issued in July, 1899, was reprinted in February, 1900. No. 6, "Orthochromatic Photography," first issued in September, 1899, was reprinted in April, 1900.*

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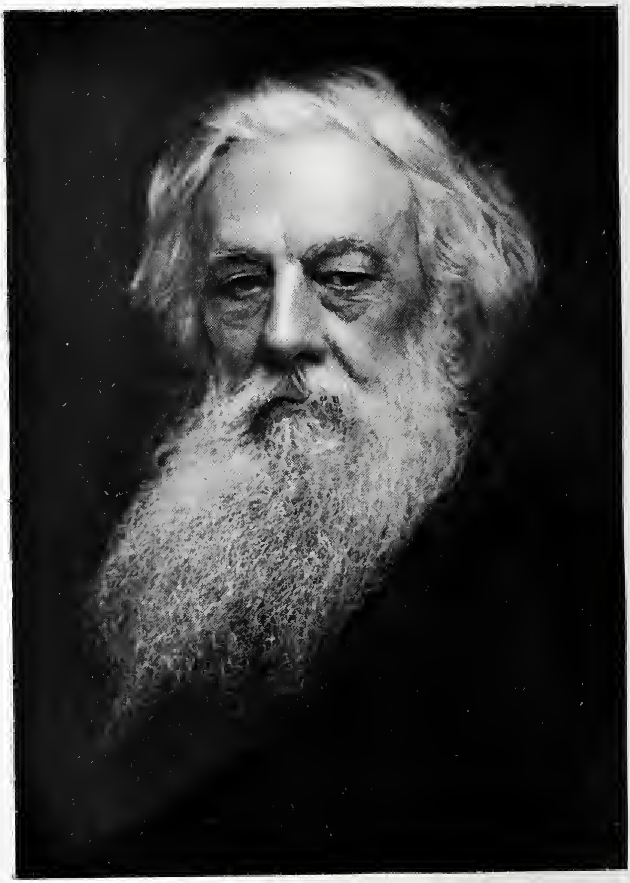

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THE PHOTO-MINIATURE

*A Magazine of Photographic Information*

Edited by John A. Tennant

Vol. I MARCH, 1900 No. 12

# RETOUCHING NEGATIVES AND PRINTS.

The retouching of negatives is a very important but little understood branch of photographic work. More than any other detail in photography its practice marks the dividing line between the professional and the amateur. With the former its use is all but universal; to the latter it is as a sealed book. Correctly speaking, retouching is not a photographic process but an after-treatment of the negative—a drawing in freehand with lead pencil on the gelatine film—to secure certain effects in the print. This is the common or professional method of its use, and it may be extended by the use of knife, crayon, or brush of color, until in its wider applications it merges into "faking" or local modification of the picture image in the negative or in the print. Retouching has been much condemned, alike by those who cannot practise it, and by those of artistic trend; we must admit that in many hands its use is pushed far beyond its legitimate scope, and with deplorable results. If, however, we judge a process by its abuse, then all photography must be placed under the ban, for certain it is, that many things photographic are produced which are without any merit whatsoever beyond the negative one of probable impermanence.

The introduction of retouching into photography may almost be said to have revolutionized portraiture, for before its practice the photographer's scope was largely limited to the production of full-length figures or of heads and busts of extremely small size. He was in fact almost in the position of the average amateur of to-day, though from a different cause. The amateur is bound by the limitations of his lens, and the photographer of wet-collodion days was handicapped by a process yielding negatives with clear high lights, and with half-tones tending to degenerate into shadows. His plates were essentially not orthochromatic, and his printing surface—a glossy albumen paper—one which rendered the minutest of detail. These two latter facts were cruelly evident in any photograph of a person with a blemished skin, or one given to freckles, or even to ruddy health. Being thus debarred from attempting large heads, the photographer soon learnt to turn his attention to that wonderful study of technical quality, not only in the sitter's face, but more in the dress and accessory, for which the old-time photograph is still so noticeable. The idea of giving artificial density to the thin parts of a negative, and so making them print lighter, occurred to some ingenious European photographer. He rubbed black chalk into his shadows and obtained prints of a clear brilliance free from the prevailing duskiness. For a short time the process was a secret one, and very remunerative. A brush and water-color soon supplemented the chalk, and then it was found that a lead-pencil proved far superior to either. The secret soon leaked out and retouching became at once universal.

**Wet-Plate Retouching.**

A few words about the conditions of the process of twenty years ago will help to an understanding of some of the apparent defects in the retouching of to-day. In the wet-collodion negative we had a film which was more noted for giving a dense high-light in juxtaposition to a thin shadow, than for giving great fineness of gradation in the half-tones. The negative rendered blue as white and red as black to a degree unknown even to the "ordinary" dry plate of to-day. Added to this was a very fine glossy printing paper, rendering detail with microscopic sharpness. It is easy to understand that with such conditions the slightest blemish or freckle was not only reproduced but grossly exaggerated. Perhaps it was fortunate that the collodion film was tender in texture and any handwork upon it had to be very carefully done.

**The Dry Plate.**

With the advent of the dry gelatine plate the old conditions which had created the retoucher ceased to exist. Harsh negatives were no longer an unfortunate necessity. But retouching appeared to have become almost a convention.

The retoucher rejoiced that the tough surface of the gelatine film would stand rough treatment which would have ruined the more delicate collodion, and based his work on the needs of wet collodion, at the same time taking full advantage of the increased possibilities of gelatine. The dry plate was later followed by a wider choice in printing papers, differing not only in sensitive coating but also in texture of surface. Mat papers became for a time the most popular fashion. Had the importance of this choice in printing papers been fully grasped by the photographer it would, in conjunction with the increased gradation possible with the dry plate, have much modified retouching. But the old idea of "cleaning up" a negative has clung with strange persistence, and to-day we have the curious anomaly of a practice followed largely in conformity with conditions which have been dead for twenty years.

**The Coming Retouching.**

What retouching *should* be, it is impossible to say. The retouching of the future is a matter of gradual evolution, rather than of demonstration. Probably the amateur will suggest it in part, but it should come more from the steady worker who day by day steadily pencils over his pile of negatives. It may safely be said that, far from being superseded, retouching, in a modified form, will be more universal in the future than in the past. Possibly it will often be nearer "faking" than retouching, but there will be few pictures, save those of beginners, which will be "straight prints from straight negatives." At present, however, we are more interested in the retouching which people know and accept, the retouching by which so many earn their bread.

**What is Retouching.**

By retouching is meant marking on the film of a negative with a lead-pencil in such a way as to give additional density to those parts which would otherwise print too dark, and so lighten them. Rather curiously, retouching is almost entirely a brightening process, and the majority of retouchers know no way of deepening a shadow except by intensifying the lights around it. Retouching is often termed flattery, but an untouched negative might with more truth be called sheer injustice. An "untouched" photograph not only reveals, but positively exaggerates, defects. It must be considered, too, that the average photograph is not a likeness of a person, so much as an aspect of that person. In proportion, too, as we know more of a person, so we recognize beauties and characteristics which the lens cannot render, and lose our knowledge of mere physical forms on which the lens insists. How many of our cleverest photographers could make a satisfactory portrait of their own wives, or husbands? I venture to think not many. But they could produce acceptable pictures of their friends with little trouble, and of their acquaintances at a first attempt. But lengthy argument of the ethics of retouching is scarcely necessary here, for retouching is a fact. In its exaggeration marks of age or care may be entirely removed, gray hairs may vanish and even features be altered. A double chin is frequently removed; and the nose, which may often appear unnatural through some defect in lighting, may be modelled as required.

To darken a print, by reducing the density of the negative, is more difficult than to add light. The film must be pared away by the careful use of a sharp knife. In the hands of a competent retoucher the knife is a very useful power, but it is unknown to most workers.

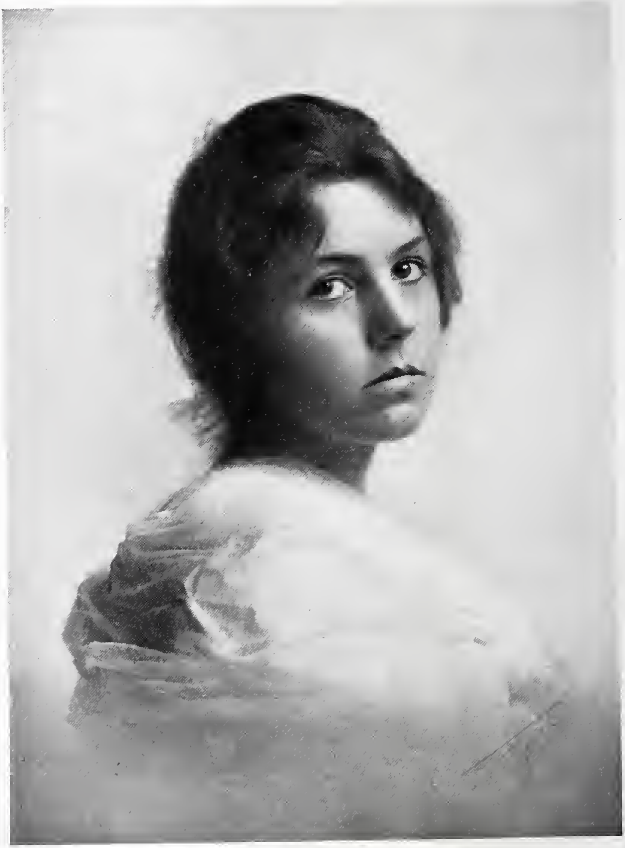
**Operating and Lighting.**

Retouching is too often relied on to remedy defects due to careless work in the making of the negative, and in as far as it allows this carelessness it is to be condemned. Too often, through ignorance or thoughtlessness, the operator will pass work with a full knowledge that the retoucher must cover his shortcomings. The combining of operator and retoucher in one person is eminently proper, for the two stages of the work should be in sympathy and understanding with each other. Let the operator, by care in lighting and exposing, attain as nearly as possible to the ideal negative—as required to give the best and most acceptable print—and he will not only ease the work of the retoucher, but also allow him to do better work.

**The Practice of Retouching.**

To learn the elementary principles and manipulations of retouching is a work of minutes; to become a retoucher competent to earn a living by its practice is a matter of much work, and months of steady trying. To be really successful in the work, knowledge and art information are as essential as technical dexterity. And here I would enter a protest against a misapprehension which is perhaps more common in England than in the United States.

By Hy. H. Pierce



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I refer to the oft-expressed belief, that retouching offers an easy and well-paid living, especially for women. There are several occupations, from bee-keeping to china painting, which are periodically exploited by newspaper writers as offering openings for girls of good education; and within the last few years retouching has been added to the list. Extravagant sums have been named as the earnings of those who worked at the retoucher's desk. The truth is that in retouching, as in other occupations, it is a mere fact of supply and demand. A smattering of the work is easily acquired, and as the retouchers are not bound by any union, there is the usual glut of half-incompetent or half-trained workers. The qualifications for learning retouching are a capacity for plodding work, with a certain measure of ability, and as these qualities are far from rare, they do not command an exorbitant price. Probably the majority of retouchers are earning less than $12 per week; in England some are working for less than $5, or one pound; and the cases where a retoucher earns more than $20 are comparatively rare. Where women retouchers are employed, especially in the smaller galleries, the work is joined with some other; often a part of the duties of a general-utility woman, who receives sitters, keeps the books, finishes prints, etc.

**A Matter of Health.** Retouching is sedentary work, and as usually practised is more so than is absolutely necessary. The work done with the pencil is very fine, and requires good eyesight and close application. Therefore no one whose eyesight is not of the best, or whose chest shows any sign of weakness, should follow it as an occupation.

**Tools.** Few tools are required by the retoucher, and except the desk, which may cost from three to five dollars, they are inexpensive. They are: a few pencils of different degrees of hardness, a couple of small sable brushes; a few cakes or tubes of water-color, some black powdered chalk and a few stumps for applying it; a little very fine emery cloth, a bottle of varnish, a silk rag with which to rub the varnish on to the negative, and a very sharp penknife or scalpel.

**The Desk.** The desk, which is shown open, ready for use, in Fig. 1, is a threefold hinged wooden board, each being about fifteen inches square. The lower wing is merely the baseboard, on which the easel rests rigidly on a table. The second sloping wing is the easel, on which the negative rests. This is supported from the baseboard by two struts, so adjusted that the easel may be placed at any slope that is most convenient for working. In the centre of this slope a hole is cut over which the negative is placed; for retouching is done by transmitted light. The upper wing of the desk is supported from the easel by a second set of struts; its use is simply to act as a hood and keep light from the negative. These two wings may be blackened on their inner sides, and a black cloth should cover them to exclude all unnecessary light. Resting on the baseboard a mirror is placed, to reflect light through the negative.

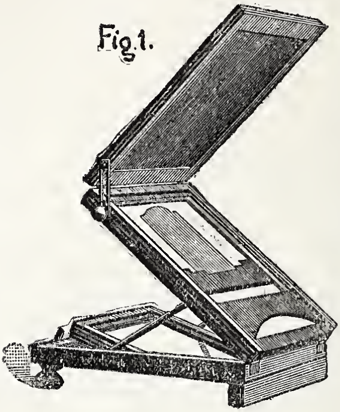
Fig. 1.

The baseboard of a retouching desk is often made of sufficient depth to contain a shallow drawer, which holds the pencils and other tools. When not in use the wings of the desk may be folded down flat. The opening over which the negative is placed may be made about ten inches square and fitted with kits or "carriers" to hold negatives of various sizes. A piece of thin but tough board should cover the lower part of the negative, where necessary, to form a rest for the hand holding the pencil. This board is shown in the sketch fitted into notched strips at the side of the easel.

**Pencils, Stumps, Brushes.** The retoucher's pencils must be of the best quality and carefully chosen from the different varieties provided for his special use. A long fine point is necessary, and this cannot be got with a cheap pencil. Some retouchers will sharpen a pencil to such a gradual taper that almost an inch of lead projects from the wood, and they keep this at a needle-like sharpness by rubbing it on a piece of finest emery paper, and afterward on plain wrapping paper. A good pencil, too, has a smooth, soft touch, free from any grittiness. Faber's or Hardmuth's pencils are good for retouching, and both firms make a series specially intended for the work, which may be purchased from anyone selling photo-supplies. These come in the form of loose leads, which are slipped into a handle and held in position by a turn of the metal nozzle of the holder. By using these "ever-pointed" pencils, as they are termed, the lead may be used to the last inch, and the balance of the holder in the hand always remain the same. If ordinary wooden pencils are used, a porte-crayon will be required to hold the pencil as it grows shorter. The hardness of the pencil is a matter of choice, or more correctly of the class of work to be done on the negative, for a good retoucher will use several. A very hard pencil is usually recommended for the beginner, but I would prefer a softer one ; not harder than H, and preferably H B.

Brushes are used for spotting out pinholes and similar defects, and also where a broader touch is permissible, as in draperies or accessories. The brushes should be of red sable, more expensive than camel's hair, but better. A properly "built" brush will taper evenly to a fine point, with no stray hairs projecting. To test a brush wet it and squeeze the superfluous water out. Then press the point on the thumb-nail, bending it sideways. If it springs back straight the moment the pressure is released, the brush is a good one. If the tip remains bent do not accept the brush.

The stumps, which are strips of hard non-fluffy blotting paper rolled up tightly into the shape of a pencil, and tapering at one end to a point, are used to give density by rubbing finely powdered black chalk into parts which need lightening. This work is usually done on the back of the negative rather than on the film side. Some economical workers save the scrapings of their lead-pencils to provide this chalk, but it may be purchased in little glass tubes at any store selling artists' supplies under the name of *Conté Crayon Powder*.

**Varnishes, or Mediums.** The gelatine film is so smooth and slippery that it is difficult to mark on it with a pencil to the extent required in retouching. We may put on a single fine stroke, but to strengthen that by putting another over it is next to impossible. The negative is therefore always coated, on the parts requiring retouching, with a varnish or "medium," which dries with a slight roughness or "tooth" which takes the pencil. If but little work is required on the negative a slight rubbing with turpentine may suffice to hold the pencil. Put a drop of turpentine in the centre of the part to be worked over, and with a silk rag or a clean finger-tip rub it gently in a circular direction until it dries. After one or two attempts this can be done so that no opaque mark shows around the edge of the patch. If necessary the turpentine may be removed, as also any pencil marks made upon it, by the application of more turpentine. There are many brands of retouching varnish on the market—most of them good. For those who wish to make their own varnish, the simplest way is to dissolve a little resin in turpentine. If on rubbing on to the negative it is thought to be too thick, add a little more turpentine. If too thin, stand the bottle in the window, in the sun, with the cork out, and it will rapidly evaporate to the right consistency. Another medium is made of pure alcohol, 2 parts; sandarac, 1 part; benzine, 4 parts; acetone, 4 parts. The best medium depends on the amount of work to be done on the negative. In extreme cases only a pencil on the bare film will be sufficient. If very bold work is required in parts, the face and delicate parts may first be retouched on the varnish, and then the plate flowed with a mat varnish, as described later, for the final work.

**Varnish for Protection.** Many workers varnish their negatives all over, after retouching, to protect the film from accident or damp. The varnish used for this purpose is a transparent crystal varnish, and though its use is only occasional in this country, it is in all but universal use in England. We refer to this final varnish because when it is flowed on the plate it has a tendency to dissolve the varnish which holds the pencil marks, with disastrous results.

To apply this final varnish the plate should be thoroughly dusted and then slightly warmed. Pour the varnish on to one corner of the plate and let it flow gradually over it, going last on the retouched parts. If this crystal varnish should require removing for any cause the negative should be laid in a bath of wood alcohol or methylated spirits, and the softening hastened by *slightly* warming the dish of alcohol, or by dabbing the negative with a wad of clean cloth. Turpentine will prove a satisfactory solvent and remover of the retouching varnish.

**Modelling.** It has been said, as evidence of the capabilities of retouching, that a clever retoucher can change the features of the face. It would be more true to say that none but a competent retoucher can *avoid* changing the features. The modelling of the face—by modelling is meant the different curves of its surfaces—is a very difficult thing to retain. To obtain it in the first place, means good lighting and careful exposure, for modelling is shown by gradation of light and shadow, and the finer gradations cannot be got unless the exposure is right.

As an example let us take the forehead. From the centre, above the root of the nose, the forehead is a succession of curves. It curves upward and backward toward the top of the head, and it curves around toward each side of the head. There is not in it a length of two inches without a curve. The forehead, too, has marks showing age—which it is often wise to remove; it has also marks showing *character*, and these should be carefully retained. Some foreheads are broad, some narrow, some low and receding, others high and straight. In a photograph the shape of the forehead is indicated in some degree by its outline, more by the variations in the amount of light and shade upon it. But too often with an intention of "cleaning" his work, the retoucher will work all shadow from the forehead, with the result that the forehead appears in the picture as a piece of absolutely white paper. This is not a supposititious case, for many—if not most—low-priced photographs suffer from this defect. This even light is sufficiently bad when applied in the centre of the forehead, but usually it is carried to the roots of the hair, making a sharp, harsh distinction between the skin and the hair. Or note the depression running upward just above the extreme outer edge of the eyebrow. The temple does not—except in a few cases—curve in one even sweep around the side of the head to the roots of the hair in front of or just above the ear. There is generally a slight flatness there—in most cases it can scarcely be called a depression—just sufficient to prevent an even reflection of light. This flatness is just where the head begins to slope back at the side; and although it is often overlooked by the operator and not considered by the retoucher, it is one of those delicate details of modelling which go to make the character of a face. We have discussed the modelling of the forehead so fully because it is often considered as the least characteristic part of the face, and treated as a flat mass. A false mark on a cheek may entirely alter its plumpness, and it is easy to remodel a lip. A knowledge of shadows is important. A shadow has not only darkness, it has also *shape*. In a face without mustache a shadow will, under some lightings, be thrown on the upper lip. It may be too dark and require lightening; if so be careful to retain the shape, and do not make the mistake of reducing its size unless you are *sure* that such reduction will be an advantage. The nose—so often the key to the whole face—may be lengthened or shortened, or altered in many ways by faulty or ignorant modelling; indeed it is easier to alter a nose than to render it altogether truthfully. When we reach the treatment required for the various features of the face, I will speak more fully of the modelling.

### Judging a Negative.

A retoucher should be able to "size-up" a negative before commencing work upon it; to know exactly what result he wishes to obtain, and exactly the way by which he can get it. This is simply a matter of practice. The veriest beginner can detect pinholes by holding a negative to the light; and the ability to see subtler defects and variations will come with a little study. The beginner should take a print, fully printed, from his negative before commencing retouching. Make the print on a glossy paper, showing every detail. Notice the most prominent defects—the shadow at the corner of the mouth, or the wrinkles in the forehead, or the deep line running from the wing of the nostril downward toward the corner of the mouth. All these parts will probably be too dark and prominent. Their appearance in the negative should be carefully studied, and by this means a negative will become as easy to judge as is a print.

### The Working Position.

I have already spoken of the necessity of good eyesight. A person whose eyesight is not both good and strong should leave retouching (as a trade) severely alone. The retouching desk, open as in Fig. 1, should be placed on a table some five or six inches from the edge, allowing room for the elbow to rest on the table. The outer edge of the right hand may rest on the thin board covering the lower part of the negative, or for some work it may be steadied on a mahl stick held in the left hand. This mahl stick should be a flat lath, about fifteen inches long, somewhat resembling an enlarged paper knife. In such fine work as retouching the drawing is almost entirely done by the movement of the thumb and fingers—that is, the wrist is not moved. Both elbow and hand may therefore lean on a support. Much depends on the mode of sitting. Do not bend or pore over the negative, but sit upright; to lean forward with an idea of seeing more closely is fatal to good work. Many of the best retouchers work sitting upright, or leaning slightly backward, and with the elbow so slightly bent that the pencil-point working on the negative is twelve or fifteen inches away from their eyes.

**The Light.** The negative should be screened from all light except that reflected through it by the mirror. We speak of the reflector as a mirror, but often it will be found necessary to use a soft mat reflector—a piece of clean white blotting paper is usually chosen. This makes the light more even. The light should preferably be from the north. The advantages of a north light are its evenness and diffusedness. Though preferable, a north light is by no means essential, but it is impossible to retouch if the sunlight reaches the reflector. If daylight is not available, a very brilliant oil lamp may be used or an electric lamp. In this latter case the light might be directly under the negative—not reflected—and diffused by a sheet of ground glass placed between it and the negative.

**The Touch.** It is sometimes thought that there is some especial virtue in the method of using the pencil. Some workers are supposed to attain their results by applying the lead to the negative in a fine stipple, that is, in a number of very fine dots, placed very closely together; others are supposed to favor a succession of straight lines, or of curved lines, or little circles. The beginner will soon drop into a stroke of his own, but he should not commence by adopting any one style to the exclusion of others. A fine stipple may be useful in modelling a shadow, and a few bold but fine lines may strengthen an eyebrow. On curves, and particularly on the neck, a long curving line may be used, and a good worker may do more to soften a wrinkle by making one careful line along its entire length than by minutes of fine stippling.

It would be useful practice for anyone commencing retouching to practise various strokes, both with a fine pen and with pencil, on white paper. Try to cover a space of one inch square so evenly with fine dots that, held at a distance of eighteen inches from the eye, the space will look like an even gray tint. Half an hour will be a very short time to do this in, and the work will not prove easy. Try drawing lines very close together, and so that no line is heavier or lighter than another, and equal distances apart. Or try "hatching"—drawing a number of fine parallel lines, and crossing them with others at right angles, or at other angles for different effects. Some retouchers work almost entirely with a fine zigzag made by pushing the pencil point back and forth on the negative; but every retoucher will find his favorite stroke in time, and he will be the more likely to adopt the best if he has tried them all.

### The Face as a Whole.

Before considering each separate feature of the face in detail let us look at the face as a whole. In the commonest view of a full face one half is brightly lighted, the other half is in shade. The most usual lighting is one in which the light comes from a window several feet higher than, and several feet on one side of the sitter. There will be one point on the forehead, and one on the cheek just under the outer corner of the eye, which reflect a patch of light; a line of light runs down the ridge of the nose, and sometimes in the sitter—and generally in the negative when the retoucher has done with it—terminates in a broader patch on the tip of the nose. There is a small light on the lower lip, and another on the tip of the chin. These lights are brighter than any other part of the face (except where there is *direct* reflection from the eyeball), and if we represent them in our print by pure white paper, it follows that, if we are to keep correct relative values of light and shade, no other part of the print may be white. Hence, if we by over-retouching raise other parts of the face to an equal degree, we destroy the modelling and character of the face.

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There is a certain amount of light falls on the shaded side of the face—probably the shadow has been softened by a reflector—but the lightest shadow is darker than any part on which direct light falls. These relative values of light must be carefully considered as each part of the face is worked on, for the more gradation and the more correct gradation we get, the finer is our result.

An important point to be considered in professional retouching is the wish of the sitter. And this brings us to the very solid fact that many persons object to any record which suggests age. As a person advances in years the smooth plumpness of the face gradually becomes creased or wrinkled; lines appear across the forehead, and around the eyes and mouth. These lines are often accentuated in the photograph (not necessarily so, as is commonly supposed) and the photographer who strives to please reduces them all too zealously. It is too often forgotten that marks in the face not only denote age, but that they also denote *character*. While age has been placing the marks the character has been shaping them. Examples in which youth are nothing, and character everything, will occur to everyone. There is a well-known engraving of Lincoln, from a portrait by Carpenter. Every would-be retoucher should study it, for it is full of the revealed personality of the great president. Contrast it with an average portrait of any recent statesman or politician. Remember as you compare them, that photography can give you all that the engraver has given, and you will admit that there is much room for better work in photography—including retouching. Some three years ago an American man-of-war was destroyed in what was then a foreign port. The captain of the vessel became a popular hero, and his alleged portrait was published broadcast over the country. The original was a man trained to responsibility by much hard service. He was a man on whom his country might have to depend in an hour of danger, and yet he was represented as a weak, spectacled youth, with a face smooth and devoid of character. We must be careful therefore that in softening marks of age we do not destroy character.

**Correct Drawing.**

The value of correct drawing cannot be overstated. If we can model our surfaces and draw our lines correctly, we thereby control an important factor of success. A perfectly arched eyebrow or a mouth curved into a "cupid's bow" may be very beautiful, but neither of them is the rule, and though perfecting of curves may be very acceptable in most businesses, the retoucher who blindly does it as a habit is disqualifying himself for the best work. Those who have passed through a course in drawing from cast or from life, know the difficulty of catching the exact shape or position of any feature, and how a line which is not quite right may spoil a likeness.

**The Forehead.** Commencing with the forehead, we will take, one by one, the separate features of the face. It was, I believe, Redmond Barrett, a leading English retoucher, who made the rather novel statement that the forehead was the most characteristic part of the face. He contended that it was the part least alterable, and being more constantly in repose than any other feature, it became, when once known, typical of the man. I give the suggestion as further emphasizing my insistence that the modelling must be kept. In the forehead we have two sets of wrinkles ; those running across from side to side, which are seen when the eyebrows are raised in astonishment, and those running upward from the root of the nose, seen when the eyebrows are contracted into a frown. In cases where these wrinkles appear they will probably be greatly exaggerated by the lighting, and to leave them untouched would be as untrue as to take them out altogether—and much less complimentary. They will appear on the negative as transparent lines through which the reflected light shines. It may be that a moderately soft pencil with one careful stroke will sufficiently modify some of the finer lines. The film of a negative sometimes dries in slight relief—that is, with some parts a very little raised above the level of the rest. This makes great care necessary, if the pencil has to be run along a line which forms a little ridge on the gelatine, for the natural tendency is for the pencil to slip from the ridge and make a mark in the wrong place. The wrinkles across the forehead may be worked out as may be most desirable to the customer, but the furrows at the root of the nose require more careful treatment. These marks not only denote age ; even more, they show character. If caused by sorrow or physical suffering, they may be modified considerably, but in no case should they be entirely removed. In many subjects the retouching will be sufficient if the heaviest shadow—it may be a very fine line only—is relieved. This shadow cast by the lighting comes out black in our photograph, but in the face of the sitter the shadow is "luminous" with reflected lights through which the color of the skin shows.

Usually the lighting of a face will be from one side. If so, there will be one high light on that temple which is nearest to the light. There is a rule oft quoted by retouchers: place the highest light in the centre of the high lights, and the deepest shadow in the centre of shadows. It is quoted to emphasize the need of gradation, which gives roundness to the face. When the highest light is placed on the forehead—and its exact position is determined by the lighting—we may work up to it, remembering that if we make any other part of the forehead *quite* equal to this high light, we at once destroy the balance. There should be no harsh line dividing the lighted part of the forehead from that part in shadow. Soften the edge of the shadow very gently—which is done by very slightly working on it with the pencil; and if very carefully done the whole shadow may be lightened a little. It is a very common custom in low-priced photography to under-expose the plate. This is presumably done in order to obtain a "plucky" negative, but it simply gives one of harsh contrasts without modelling or detail either in the lights or in the shadows. When retouched, its "contrastiness" gives a certain quality to the portrait which pleases the customer. But so long as a photographer turns out such work he will find that his endeavors to reach a higher, better paying, class are unsuccessful. By doing away with much of his retouching through more care in lighting and exposure, and then doing what retouching is necessary with care to retain the modelling, he may make one of the surest steps toward improvement.

Where the eyebrows are contracted, causing two upright furrows, there will sometimes be noticed just outside of, and parallel to, the furrows, two small ridges, one over each eye. These should not be removed; in fact, as they appear as lights rather than shadows, a touch of the pencil will emphasize them, and this may be an advantage. The eyebrows in some persons project slightly, and as the skin slopes outward toward them it catches and reflects the light. This has been noticed by some European, and especially German, retouchers, who have taken advantage of it to add another high light to the face. In much recent work it is magnified into a triangular patch over each eye, and I believe it is supposed to add force and dignity to the face. It is not much used in America, or in England, and will not, I hope, become universal.

**The Cheek.** From the forehead we descend to the cheek. We will usually find the highest light on the cheek-bone, showing most prominently just below the outer edge of the eyebrows. On the correct modelling of the cheek much depends. If the shape of the high light is altered along its upper edge it infringes on the shadows and markings under the eye, and unless the cheek is properly graduated into the side of the nose—which is really a continuation of the curve of the cheek—it may much change its appearance. The retouching of the cheek is really the modelling of the eye and the nose. There may be a hollow, marked by a heavy shadow. This sunken cheek may be due to many causes; often a mark of age, or care, ill-health, or loss of teeth. This shadow may be lightened by a few lines with a fairly soft pencil, giving a suggestion of plumpness. A similar shadow sometimes appears in a plump, robust face. In this case it is simply due to the plate rendering as black (shadow) the red of a healthy ruddy cheek; and may be retouched out. Here on the cheek we meet with the most pronounced freckles, and these may be entirely removed, one by one. The retouching of freckles may sometimes be made easier if the operator can persuade the sitter to wash in warm water and then rub the cheeks vigorously with a rough towel. This causes a general flush of redness in which the individual freckles are lost, and the whole mass may be lightened more easily than a number of separate patches.

**The Eye.** The eye is considered the most difficult and delicate part of the face to retouch, and the young worker in a professional studio is usually forbidden to touch it. An eye left severely alone is better than one badly handled. In the business house this part of the face is attended to by the chief retoucher, after his assistants or pupils have gone over the rest of the face. Before commencing to retouch the eye, carefully examine a print from the negative. No other feature so much varies with changing years and temperament. Through childhood to youth the shape of the inner corner changes, and as the subject grows older the changes begin to gather around the outer corner. Every stroke of the pencil around the eye should be carefully considered, and the rule should be, for the beginner, to make as few as possible. Here we come to the vital question of what is wanted in the photograph, and the answer leads us to adopt different treatment for the eye of a man or a woman. In the case of a woman, beauty is usually the first consideration, with—in the American woman—dignity of carriage as a good second. To obtain beauty we give more softness to the eye, not obliterating all marks, but very much reducing them. The form of the eye is not always absolutely retained, a slight accentuation of curves being adopted. In photographing the American man of to-day the tendency is toward alertness, often almost to aggressiveness; particularly if the subject is a politician or a man of money. A slight knitting of the eyebrows may be shown—this is left when the forehead is retouched—and it is helped by a certain depth of shadow cast by the eyebrow over the upper eyelid. When the eyebrows are knit, not only are the upright furrows formed in the forehead, but the brows are themselves brought nearer together. If more placidity is required in the face it will often be helped by taking off a slight strip at the inner end of each eyebrow, pencilling the negative at this point until it is the density of the surrounding skin.

In endeavoring to obtain, or retain, beauty in the eye we must avoid heavy shadows, and especially must this be the case with dark-eyed and dark-skinned people. To say this is to emphasize once more the need of careful operating. Retouching should be an improvement of good operating, and not a remedying of careless work. An eye carelessly photographed may be such a jumble of lights and shadows that a satisfactory retouching of it is impossible.

If there is a direct reflection of light from the white eyeball, this reflection will be the brightest part of the picture; many degrees brighter than the spot on the nose. If possible, avoid retouching the eyeball itself, but in some cases it will be necessary. There will be two main patches of light, under most lightings—one on the white of the eye nearest the light, and the other on the iris, or colored ring surrounding the black pupil. The light on the pupil will be wedge-shaped—or like a section from a convex lens, with the point downward. It is a great mistake to raise the white of the eye equally all over its surface. In elderly people, a little moisture collects along the lower eyelids, and if the light is reflected from this it will give another patch of light. By raising the whole eye evenly these modellings are of course quite destroyed, and the finished result, void of reflections, suggests an eye made of some unpolished, or mat substance, such as chalk. Where the eyeball is over-retouched the worker will, in addition, often prick holes in the pupil of the eye with a needle or fine knife-point in order to make it blacker. Such should never be done. Another fault of over-retouching the eyeball is the unnaturally harsh division of the white and the iris. The eyelashes throw a shadow on to the eye and soften the junction of the ball and the lids. From this the young retoucher may learn the rule that little or no retouching should be done on the eye itself and his efforts be directed to the surroundings. Just under the outer corner of the eye is a little cluster of wrinkles—crow's feet—in a subject of middle age or older. These increase with advancing years. They may be softened by partially filling them in with the pencil, and sometimes the minor ones may be altogether removed. These little wrinkles also collect round a very merry eye, and may be as characteristic of merriment as of age. In elderly subjects a strong fold—it can scarcely be called a wrinkle—runs from the inner lower corner of the eye, curving outward and downward, until it is lost in the cheek. It is the boundary of that gathering of skin under the eye known as the sac. Between it and the eye several minor wrinkles spring from the same corner. These may be softened or modified "to taste;" but do not remove them, or the shade under the eye, entirely. There is a practice—fortunately not common, and confined to a mediocre trade—of working all shade from under the eye, and allowing the eyelashes to stand out boldly against the white skin. These eyelashes are not shown by retaining the natural ones—they would be altogether too delicate and insignificant—but they are modelled from the shadow itself, or they can be put in with care and a sharp knife.

Manipulation of this kind is altogether unnatural and undesirable. Unless we peer very closely into a face we do not see the individual clusters of hair forming the lash, and if they are shown in a photograph they are more likely to cause an unpleasant suggestion of disease than to lead to appreciation of beauty.

Under a too pronounced top lighting a heavy shadow may be cast by the eyebrow and this should be carefully lightened.

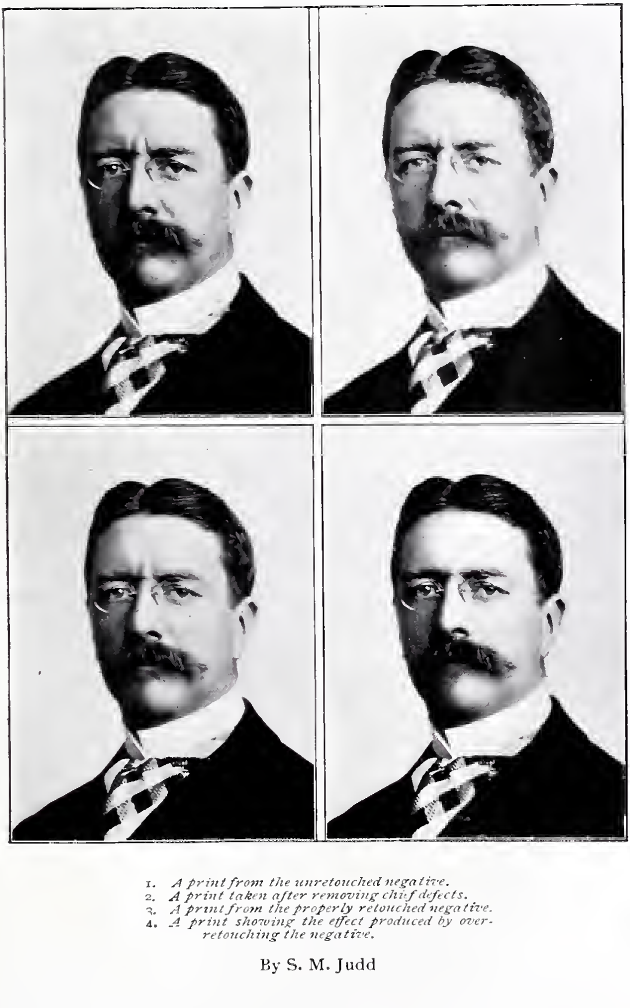
It has been said that an artificial smile commences at the mouth but that a genuine one commences at the eye. Some people may be very happily represented with a suggestion of a "twinkle" in the eye. As the smile comes the lower lid is slightly raised, the outer corner of the fold in the upper eyelid which overlaps the lower one and points down the side of the face toward the lower lobe of the ear is drawn inward, closing more closely around the lower lid.

**The Nose.** No feature influences an operator in his choice of a pose so much as does the nose. Very few persons are acquainted with the shape of their noses, except as seen full view in the mirror; and indeed we best know our friends—the personality behind the features—by a full-face view. So prominent is the nose, and so much more in evidence in a photograph than in life—in life we are more drawn to the expression in the eye—that very great care, and much tact, is often required in successfully reproducing it. The custom with those retouchers who turn out finished negatives in quantities by a semi-mechanical process is simple. A straight line of light is run down the entire length of the nose, and a finishing light is placed on the tip. The fault of this method is that it is not natural. In some extreme cases, where one full-face pose is almost invariably used, the nose is entirely the creation of the retoucher. By this I mean that the nose of every portrait turned out by a firm are as much of one pattern as is the background or the accessory. There are at least two galleries in low-priced districts in New York City in which I have observed this in well-filled show-cases.

This line of light is of importance in determining the shape of the nose. When it is run down in one straight line it suggests a straight Grecian nose. But Grecian noses are not the rule. The upper part of the nose is modelled on bone; the lower part is simply cartilage or gristle. Those without the slightest knowledge of anatomy will have noticed that in skulls there is no bone following the line of the nose—merely a few thin fragments of bones as if the nose had been broken off. This missing part in the skull is the gristle in the living person, and where it joins the bone there is usually an outward mark, and this will be shown in the line of light either by some deflection, or change in width or by a break. Perhaps the best rule—and rules are good if tempered with discretion—is to run the line of light down the nose as far as this junction, and then to make a very slight break in it before continuing to the tip. If the operator has done his work well, the light will not need creating, merely strengthening. Its shape should be carefully noted in the print taken from the negative before it is worked upon. This line of light down the nose determines its *width*. In the very common pose of a not quite full face, lighted from one side, the whole ridge of the nose shows against the shadowed cheek, and as the light is reflected from that edge of the ridge nearest the light, the breadth between this light and the cheek in shadow gives the width of the nose. A very slight error, therefore, the mere breadth of a pencil-stroke, will be sufficient to give a false rendering. But all retouching is just knowing when to make the stroke and when to abstain. The light which is placed on the tip of the nose has a very considerable part in determining its shape. The nose ends in a rounded curve, and the exact spot from which the light is reflected varies with the shape of the nose. On a *retroussé*, or "turned-up" nose, the light will appear higher than on a long straight one. A very slight lowering of the point in the one case, or raising it in the other, may much improve matters. In the handling of this line and point of light the retoucher may add a certain dignity to a somewhat weak face. A slight altering of the length, or a slight wavering or broadening of it, and the nose may be made finer or broader as required, and if very judiciously done, without affecting the likeness. I suggest this without entering into any abstruse questions either of truth or art; the retoucher finds it necessary to improve appearances—that is the reason of his existence.

There is a pose which is common at present, and is, I fear, in unskilled hands, scarcely to be considered a

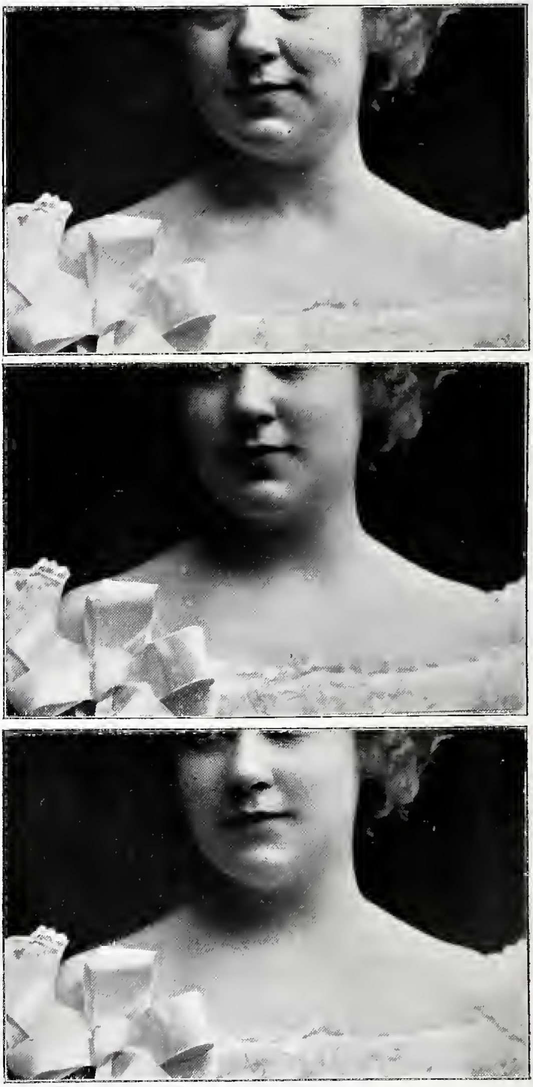
PLATE I.



1. *A print from the unretouched negative.*
2. *A print taken after removing chief defects.*
3. *A print from the properly retouched negative.*
4. *A print showing the effect produced by over-retouching the negative.*

By S. M. Judd

PLATE II.



1. *A print from the unretouched negative.*
2. *The negative retouched and modelling preserved.*
3. *Over-retouched and modelling lost.*

By S. M. Judd

success. I mean the profile Rembrandt. A side of the face seen in shadow, with the profile brilliantly illuminated. To attain complete success in this is more the province of the operator, and outside the scope of this article; but I would protest against the absolutely hard line which is sometimes used to bound the profile. It is in such a case that the most careful modelling should be followed, careful because necessarily so fine in gradation. It is a fairly safe rule to assume that sharply defined high lights are less admirable than softer and more graduated ones.

The wings of the nostril should be dealt with very gently; just a slight soft light on them, being careful to retain the roundness. The nostril itself may be in shadow and photograph quite black. This should be lightened in tone or it will appear unpleasantly prominent in the print. The sides of the nose—sloping down to the cheek—must be very carefully handled, if at all, and become really a support to the rotundity of the cheek. An important factor in determining both the size of the nose and the cheek is what is termed the labial furrow—that furrow which runs from the wing of the nostril toward the outer corner of the mouth. This furrow is not so common in Americans as with some foreigners, and I suppose that is the reason why American retouchers are given to emphasizing it while the retouchers of other countries tend to minimize it.

**The Mouth.** On the upper lip we find a shadow, more or less distinct according to the lighting, thrown by the nose. It is a shadow which should not be removed, and if it requires to be lightened, care must be taken that its shape is not altered. In the centre of the upper lip there is a groove running downward from the nose, and as light is reflected from this, on the side furthest from the light a little strengthening may be required. The relative lightings of the sides of this groove may, however, be changed by the shadow of the nose, which may fall across the side farthest from the light and so lower its tone. In approaching the mouth properly, by which, speaking photographically, I mean the lips—we are confronted with the old difficulty of having to aim at an ideal. The beautiful mouth is the one in which the lines take the shape known as "Cupid's bow," but this perfectly shaped mouth is the exception. The difficulty here confronts first the operator, for through a certain unevenness of form, or for other reasons, a mouth may look much better in some positions than in others. Unfortunately the same applies to the nose, and the best position for the nose may not be the best one for the mouth. In such a case the most the operator can do is to compromise matters, and leave it to the retoucher to do his best toward obtaining the result which will please, without destroying the likeness. There is usually a bright spot on the curve of the lower lip, and as the exact point from which it is reflected depends on the fulness of the curve, a slight alteration in its shape or position may change the entire value of the lip. Do not have an absolutely black shadow in the mouth. Sometimes, if the mouth is slightly open and the light from the front and on the same level, we may get this blackness—not otherwise. There are just three degrees of shade in the lips. The upper lip casts a shadow on the inner part of the lower lip, and inside this shadow the lower lip is the darkest. The brightest part is the lower lip where it catches the light, and between them in intensity comes the upper lip. The lips are another instance of the need of judicious modelling. If the parts around them are unduly brightened the lips appear too dark by contrast. There may be several dark cracks running down the lips. These are simply the result of the skin being dry and should be removed altogether. They would have been avoided if the operator had asked the sitter to moisten the lips. It is seldom wise to do much retouching on the lips themselves. The corner of the mouth is the part requiring the most care. When the hollows at the ends of the mouth where it merges into the cheek are clearly defined, they are apt to give too decided a shadow in the photograph. This shadow leads downward, and not only does it tend to give a sorrowful or dissatisfied expression, but it also has a suggestion of age, associated with toothlessness. It should be considerably reduced. More difficult is the mouth in which, by faulty lighting, there is no mark or shadow at its termination. This will invariably have an unfinished look, and some retouchers can make just a suggestion of shadow by lightening the parts around it. It has been suggested that a shadow might be added by a judicious use of the knife, as described in a later paragraph. But the man who can handle the knife successfully for such a purpose possesses unusual skill. In some fleshy subjects the line running from the wing of the nose blends into the one from the corner of the mouth. This is almost invariably done in pen and ink line sketches, but it will not pass muster in a photograph. A slight break should, if at all possible, be made at the line ; but at best it will be a compromise.

**The Chin.** In retouching the chin it will be found that there is much variety of treatment needed. We have strong chins and weak ones, round and square. The first rule should be to keep the chin subservient to the rest of the face. Do not brighten it until it can attract attention from the cheek and the eyes. If the chin is weak, a little working of the light down into the edge of the shadow where the chin recedes may strengthen it. There is often a dimple, or suggestion of a dimple, in the centre of the chin. This should not be entirely removed, and the same applies to dimples in the cheeks, especially of women and children. The darkest part of the chin is next to the highest light, as it curves toward the neck ; as it nears the neck it receives reflected light from the chest and shoulders.

**The Ear.** Very little can be said about the ear except to mention that it is worthy of consideration. There is a feeling that the ear is a more or less characterless organ ; a belief which is held by no one who has studied sketching from living models. It is indeed the ear which proves the great difficulty for young pencil artists. In photography the ear falls more into the province of the operator than of the retoucher. His fault is a tendency to make the ear too broad—small ears are the fashion, being considered a mark of blue blood. All the retoucher can do is to give a suggestion of length by emphasizing the perpendicular lines of reflected light, at the same time being careful not to bring the ear into too much prominence. He may also shave a slight strip from it as described under another heading.

**The Neck and Bust.** In the shoulders and bust we often have a not unimportant part of a likeness. In men's portraits the neck and throat are all that are shown, and the usual fault of retouching here is to do too much, especially in full face portraits. The modelling of the neck should be more or less in shadow, for if it is lightened up too much the throat is brought forward into the same plane as the face. The larynx—the Adam's apple—may cast a shadow which should be softened but not entirely removed. For the case of a lady in a low-cut dress we are met by the commercial difficulty which, fortunately, in this case works to the advantage of the "artistic" side. The shoulders and bust may cover an area equal to the entire face, and the retoucher cannot give unlimited time to them. The usual custom is to obtain what may be termed a marble or alabaster polish to the shoulders, a case of overdoing it. Where the bones or muscles of a neck show they may be almost entirely removed. The large muscles which run from the back of the ear to the breast-bone will show in some poses, and may be removed, except an indication where they join the breast-bone. This slight hollow marks the length of the neck. In working over a neck a bold stroke running across the neck should be used, not one running perpendicularly downward. On the bust the lines may more or less indicate its contour, swooping downward from one shoulder and curving upward again toward the other. The beginner will not be able to make any very long single strokes, but an attempt to give them in sloping position, inward and downward will prove the most successful. In some subjects inclining to plumpness there is a shadow at the centre of the bust, and in some professional portraits this is accentuated almost to vulgarity. Where it occurs it should be softened. The whole treatment of the shoulders and bust is much a matter of the individual care and taste of the retoucher. It is a safe rule to suppose that a little flattery in the work will prove acceptable.

**Arms and Hands.** These features are more dependent on posing and lighting than on the retouching. Happy is the man who has mastered the posing of hands. A bare arm should be worked with a sloping or curved line—neither straight down nor straight across it—and keep the line in one direction along the entire length. If there is a hollow at the elbow do not remove it, though it may be softened. If veins show in the arm they may be removed, and the knuckles of the hand and bones of the wrists may throw harsh shadows which should be softened. Remember that the face is the centre of interest, and keep the hand in half tone.

**Hair.** Hair sometimes needs retouching; either it is out of focus or it is too dark. In either case, a few carefully added lights will improve matters. Do not retouch hair with lines of light, but with patches of light. To add many fine lines, running in the direction of the hair, suggests grayness. The light should be added in patches, and running across the direction of the hair. In the case of men, if their hair is neatly brushed, there will be a reflection of light along the head, parallel with the parting in the hair. This will curve slightly, following the shape of the head, and the curve should be retained. The more curly hair is the more will be the patches of light reflected from it; a few only of these should be strengthened.

**Retouching a Head.** In the foregoing paragraphs we have indicated and suggested a few lines of work—retouching is so little in teaching and so much in intelligent practice. We will now very briefly describe the retouching of a negative, choosing a cabinet head and shoulders, and working on it, not necessarily in the way of all retouchers, but in a manner suited to a beginner. When the negative is placed in the frame, place behind it a piece of opaque paper with a hole cut underneath the head. This will prevent the light being reflected through the negative, except at the part actually to be retouched. We described as part of the retouching frame a strip of thin wood on which to rest the hand. As the beginner becomes more familiar with his task he will probably discard this and use instead a sheet of smooth paper, covering the lower part of the negative. The reason of this is that he will find it better to turn the negative in the frame as he makes strokes in various directions across it. Thus, if the negative is placed upright when retouching (downward) strokes are placed on the nose, it will be held almost on its side when the neck is worked across. The skilled worker often likes his negative so that it is easily twisted in any direction—though it is only just to mention that those who do not turn their negatives often condemn the habit. If the desk is one of the usual kind as described, it should, either by a clamp or other means, be prevented from sliding on the table; a desk that is not absolutely firm and true is a nuisance. The negative is varnished, to give the necessary tooth, and the pencil-point finely sharpened on very fine emery paper, and finished with a rub on fairly smooth wrapping paper. First fill in the transparent spots caused by blemishes or by freckles. A small spot may sometimes be sufficiently altered by touching it in the centre with the tip of a fairly soft pencil, held perpendicularly. Rotate the pencil once or twice between the finger and thumb, when it will make a sufficient mark. Larger spots may be stippled out, but better, I think, is to remove them with two or three fine strokes across them, made in the direction of the curve of the face at that place. These lines may be straight or slightly curved, according to the taste of the retoucher. They will break up the spot without totally removing it, and will give to the face that "grain" effect, dear to the hearts of so many. The number and fineness of the strokes made should be governed by the need of bringing the blemish to the same degree of density as the part of the face surrounding it. This first removal of blemishes completed, we are ready to commence the real retouching. The wrinkles and marks on the forehead may be much reduced, but not entirely removed ; where possible do the necessary lightening with one careful stroke of the pencil. Then soften the upright furrows at the root of the nose and model the side of the nose if needed. Do not touch the eye itself, but soften the furrows under it, turning the negative to obtain the best stroke. For most workers the easiest stroke, and the one they will have most in control, will be one running downward, and from right to left. Remove the black line if between the lips, and soften the shadow on the chin. At this stage make a print from the negative and compare it with a print made before commencing work. Having filled in the blemishes and the darkest of the wrinkles and decided shadows, more delicate modelling, working up to the high lights, should be done. For this a variety of lines may be used. A bold effect is sometimes obtained by working with a cross-hatch or lines drawn in one direction with others drawn across them. This modelling may show too decidedly, and if so it can be softened by touching the point of the pencil into the little squares, just as though removing very slight blemishes. Perhaps for the beginner fine lines, either straight or curved, and following the line of the face, will be the best.

**Altering a Shape.** In commercial work the photographer's aim is to represent a sitter at his or her best, and it often happens that some slight defect, hurtful alike to the likeness and to the artistic value of the picture, may escape the notice of the operator, or be beyond his power to conceal. The modelling of a feature into a new shape is merely a matter of practice. By blending the edges of an eyebrow into the skin—by much pencilling—the brow may be given a more nearly perfect arch. The unevenness of the lips may be modelled into a more beautiful curve. There is no especial instruction to be given upon these details. It is a matter of attaining proficiency along the lines laid down for straight working, and of the ability to apply that proficiency. A more legitimate use of this power is in the removal of some object from a line. It may be that some dark accessory—perhaps even the head-rest—has been allowed just to show beyond the contour of the face. This may be lightened to blend with the background, or if the ground be dark, lowered to its tone by use of the knife. A graceful fold of drapery may be spoiled by some break which the pencil or knife can remove. The thickness of a waist or the plumpness of an arm may be pared down ; and any alteration effected that is not beyond the skill of the worker. For this class of work the knife is much used.

**The Knife.** Retouching with a pencil is limited to the adding of density to a negative, and the need of some means of reducing density is self-evident. This is attained by using a knife, a tool by no means universally used, its drawback being that some little skill is required to handle it successfully. The best knife to use is a surgeon's scalpel. These are made in all sizes and shapes, and one with a fine blade about a couple of inches in length, and with a long small handle, easy to hold firmly, should be chosen. The steel of the knife must be of the very best, and be kept at a razor-like sharpness by frequent touches on a hone. The only part of the knife used is the point, or the curve leading to the point, and it need scarcely be said that the point itself must be without appreciable thickness. In reducing density from a surface, as for instance from teeth, which are usually represented too white in a photograph, the negative is laid on the desk, and the film very carefully shaved or pared away, the blade of the knife sloping very little from the film itself. It is better to take more than one shaving than to take a thick one and overdo it. The use of a sharp knife-blade, or a needle in giving a black stipple by pricking through the film, has been referred to and condemned when speaking of the eye. There are times when such a stipple may be useful in reducing a background, or very occasionally in strengthening hair. The knife is more often used in removing an object or altering an outline. It may be a successful portrait of a child, in which the arm of the mother interferes, or it may be a too stout waist that must be reduced to more youthful proportions. In this work the tip of the knife is used, the handle sloping only slightly from the perpendicular. In this way, by careful scraping, the removal of as much film as necessary will be easy.

**Retouching of Dress, etc.** The retouching of dress or of accessories must be done with a much freer touch than that used on the face. A soft black pencil cut to a chisel point will strengthen lights in drapery, or the same result may be attained by the use of water-color (either neutral tint, or a tint to match the color of the film), applied with a brush. In a dress —especially in the bodice—slight folds are emphasized, with an unpleasant suggestion, to a lady's mind, of ill-fitting clothes. It is, of course, perfectly legitimate to remove these entirely. There is a custom followed by some retouchers of pricking out high lights in the accessories. It is a safe rule to keep the accessories subdued. Often a lady will be photographed in a white dress ; probably late in the afternoon. The operator must either under-expose on the face or over-expose on the drapery, and he generally compromises. With such a negative the retoucher will with a few strokes —which must be very vigorous—endeavor to indicate the laces or ribbons or feathers, and the whole face will have to be held back in the printing to obtain the detail in the dress. Such subjects naturally lead the retoucher into the broader domain of faking.

**Brush and Crayon.** A wash of water-color, put boldly on with a fine brush, will strengthen a light in a dress better than much careful pencilling. Crayon, or crayon-powder, rubbed in with a fine stump, is invaluable on weak or under-exposed negatives. To obtain the necessary tooth a mat varnish is used which may be made, or which is bought from any dealer at a reasonable rate. This may be applied to the film itself, but it is more commonly applied to the back of the negative. The chalk is worked in with a fine stump over the thin parts. Thus a black dress may be held back in the printing, or the dark underexposed foreground in a landscape may be redeemed. The whole question of faking a negative is an interesting one, and deserving of a MINIATURE to itself.

**Spotting.** Negatives are liable to suffer from pinholes and these print as black dots. To stop out a pinhole take the finest sable brush, charge it with color of the right density, and bring it to a point by rolling the tip on the palette. Hold the tip of the brush perpendicular to the film of the negative, touching the centre of the hole so that the color will fill the hole. Sometimes, but rarely, a second application of color will be necessary. Pinholes that occur in thin parts of the negative—such as dark clothes, etc., should be left alone. Any attempt to improve them would probably result in overdoing it and so showing a *white* spot in the print. The usual fault in the beginner's spotting is a tendency to make his spots too dense. If the spot is a large one a little powdered gum arabic should be rubbed in with the color. A thin wash of this is then given to the spot, which is afterward brought to the right density by further stippling over the first wash of color.

**A Lay Model.** The suggestion has often been made, and as often scoffed at, to obtain a plaster cast of a head, on which to practise lighting. Such a head can be obtained from a maker of plaster casts, or at art stores, for about a dollar; obtain one about life size, just the head on a pedestal. I suggest this as useful to the retoucher because he may pose his sitter, develop his negative, and work on it with his sitter remaining in the same position —allowing comparison as the work proceeds. The cast when purchased will be of white plaster and should be colored to a more or less flesh tone. This is done by giving it a thin priming coat of boiled linseed oil, rubbed in with a rag, and when it is dry paint over it, using a brush, a second coat of oil thinned with turpentine and tinted with a little Venetian red. If a photograph be made from this model and a print compared with the original, the shadows will appear unduly dark in the print. Much careful experimenting with the lighting will be time well spent. The retoucher with his original model before him, a print from the negative, and the negative itself will be able to verify his work as he proceeds.

**Retouching Prints.** The retouching of prints has always been a necessity in photography. In the past it has been confined to "spotting," that is, touching the white specks which could not be kept from prints, with a brush of water-color to reduce their prominence. The practice of spotting is sufficiently described by its name. A brush is used, much as in the spotting of negatives, and a touch of color carefully placed on the spot. Indian ink mixed with color and a *little* powdered gum, forms a good spotting medium, and by more or less dilution with water its tint can be matched to any density of the print. The professional photographer burnishes his prints by rubbing them with white wax dissolved in benzine, or Castile soap, and passing them through heated metal rollers. This burnish, or polish, on a print naturally renders it more or less waterproof, so that the spotting cannot be placed upon it. If much work has to be done on a print which has afterward to be burnished, it is well to slightly burnish the print by passing it through the rollers, under little pressure, and without any soap. Then add a little thin mucilage to the water-color, and the spotting will be easy. If a print is well spotted the marks will not show except when looked at in a reflected light. Then, however, the spotted parts will be dull and mat against the polish of the rest of the print. The remedy is to reburnish, using soap to give an actual film of gloss. Where a heavy color has been placed—in the deep shadows—fortify it by placing a touch of mucilage water on it, or it may move in the burnishing. The print must be absolutely dry. In burnishing, it is passed through hot rollers, and the slightest trace of moisture left in the mount or picture or any of the spots will be driven out and make a mark.

The neutral tint given by Indian ink will suffice for small spots, but for larger markings it will be necessary to match the color of the print. For platinotypes the ink will usually suffice; bromides will be improved if just a trace of ultramarine is added to the black. A little rose madder, or burnt siena, will slightly warm the color to match a warm-toned print, and any of the numerous tones or colors in fashion to-day may be worked over with the ink, tinted to its own special color. In working on this "straight" class of work the secret is not to overdo it; the fewer touches, and the lighter they can be made, the better. If a black spot occurs in the print it must be lightened in a similar manner by using Chinese white shaded to the required tint. But as this necessitates the use of a body-color (as distinct from a mere wash or stain, as when using Indian ink), it will not stand subsequent burnishing.

The necessity for spotting prints may be much reduced if sufficient care is used. One fault of beginners is to overdo the work when spotting pinholes in the negative, so that instead of a black spot in the print we have one lighter than the surrounding part. A careful printer can save spotting by keeping his negative and his sheets of paper free from dust.

**Finishing Platinotypes.**

The finishing of platinotypes is a special branch of work. The paper allows more scope for brush-work than does the more finely textured glossy paper, and often it needs more. The subject has been very lucidly treated by Miss Phillis Bell in *Mosaics*, from which I quote: "There is roughness in the texture of the image on the platinotype paper that needs pulling together. Careful handling is necessitated by the moisture-absorbing quality of the paper. One must know, too, just how much color to put into one's brush for the effect desired, as a false touch of color, once put on, cannot well be got off again. When once the requisite lightness and firmness of touch have been attained, however, platinotype paper offers a delightful medium for brush-work, and a well-finished platinotype print is most pleasing to the eye.

"The beginner should take up a few waste prints for his early practice. A few black specks may be noticed here and there on the print. These must be lifted out bodily with a knife. A small scalpel is the best knife for this purpose, with its rounded blade and pointed end. Practice in its use will bring skill, and the specks can be easily removed without a mark on the print. Unless they are taken out, they will entirely spoil the effect in the portrait.

"When a too heavy touch of color has been put on, it may be reduced in intensity by quickly applying a brush that has been washed out in clean water. This must be done with scrupulous care or the surface of the paper, being soft, will rub up, which will be fatal to the print, as it is almost impossible to get it smooth and even again.

"The roughness of the paper also necessitates care to see that the color is so laid on that it appears right whichever way the print is held to the light. It will, of course, look best when the print is viewed in the same light-direction in which the work was done, but the finisher should turn the print round as he works, and view his work from both sides—*i.e.*, lighted from left and right—as the work proceeds.

"Have your colors ready: lampblack and sepia, water, a No. 2 sable brush for the eyes and fine parts of the face, and one or two larger brushes for the broader effects of dress and background. Have also two or three compartments in your palette—a china one—for color of various thicknesses, or two or three little saucers.

"Look at the tone of your print; if it is a black tone, the lampblack by itself will probably match it; but if it is of a warmer tone, slightly inclining to brown, it will be necessary to mix with the black a little sepia. See that the color, when mixed, is exactly the tone of the print; I have seen photographs that have been finished with a color that did not match, and the effect was execrable.

**The Face.**

"I have always found it well to begin with the eyes, after doing the usual spotting, for spots distract one's attention; the eyes speak out the mind and character of the person plainly, but they have to be done with the greatest care. Do not try to alter them unless you understand the principles of drawing. Observe where the pupil comes. The pupil and shadows of an eye often come out too faint in a platinotype, and need strengthening; but it must be done lovingly, not to put a black patch of color in the middle and a black line round with a strong black line for eyelashes, but to put the color in with care and judgment. The eyelashes may be strengthened, but with care, and the eyebrows and any inequalities of lighting blended. This is where the pulling together comes in; a strong light here, which catches the eye too much and must be toned down, or a little shading in of the neck there, bringing all into harmony.

" The hair, also, often needs attention. In the case of ladies, perhaps, a fringe has got an awkward break in it which needs to be filled up, and some shadows may require to be strengthened, or high lights toned down. Especially is it necessary to touch up the hair in cases where it is turning gray or is quite white. Gray hair always photographs whiter than it is, and people are often sensitive about their hair turning gray, so this must always receive special attention. It must be darkened in all the shadows, and carefully shaded in all the high lights.

" Having finished the face, you must now take the dress. In white dresses a good deal will be found necessary to do; shadows to be strengthened and other shadows, perhaps, to put in where detail is wanting. A great deal can be done in this way to improve a photograph and make a pleasing picture, especially in evening dresses, where filmy lace or chiffon seem to compose the bodice.

**Backgrounds.**

" The background is a very important part of the picture. There are two ways in which a background can be put in. One is: have some black chalk and white chalk scraped to a fine powder, also a little sepia chalk to tone the mixture to the color of the picture, and with a pad of cotton-wool rub the color into the background, with a circular motion, until the desired tint is obtained. Care must be taken to have no grit in the powder. Now, with a piece of pointed india-rubber trim off the edges either with a suggestion of leaves or a cloudy effect. There is room for much fancy in this method; it is a quick and ready way of putting in background and is very effective. The amount of background must, of course, be regulated by the kind of picture it is and how much is required to throw up the head and shoulders sufficiently in relief.

" The other method of putting in a background is to wash it in with color. This requires the greater skill, and is much the more artistic. Your larger brushes and other saucers will be required now.

" Take the thinner color first and wash quickly and evenly over the part of the background you wish to color. Have another large brush ready, washed out in clean water, to take off any hard line that may come; then take your thicker color and put in the denser parts. This putting in of cloudy effects of background with washes requires a good deal of practice. There is great scope for taste and skill to be shown in the painting in of a proper background."

**Brush and Pencil.** Working on the print is becoming increasingly fashionable, more especially with the amateur and the photographer who has a high-class but limited trade. This retouching can scarcely be called photographic, nor can any hard and fast instructions be given for it, for every man follows his own inclination. Very often a brush or a pencil may be very liberally used to block out some part not required. Take for instance a baby picture. The baby is seated in its mother's lap and is successfully photographed on a four by five plate. The baby may make a pretty picture if the print is trimmed down to say two inches by one and one-half. But the mother's dress and arm are too prominent, and by a wholesale application of pencil are entirely obliterated or merged into the background. This is the crudest way of working, but with some subjects it is effectual. In more careful work any part of a print may be lowered in tone by a stipple with color of the right tint. This stipple is a number of very minute dots close together, placed from the tip of a fine sable brush. But the whole question of the working up of prints is one which is only touched when the necessary technical skill in handling the brush or pencil is acquired. Technical skill should be supplemented by much study of drawing and more particularly of the laws of lighting. Drawing from the cast, or still better from life, should be practised by those who have the opportunity. A knowledge thus gained, and maintained, will prevent the retoucher from becoming a mere creator of texture. In the difference between mechanical work and trained intelligent work, lies the difference between failure and success.

## BOOKS.

*The Art of Retouching Negatives, and Finishing and Retouching Photographs.* By Robert Johnson. 1898. (English.) Very full in its information, and well illustrated. Cloth, $1.00.

*A. B. C. of Retouching.* By Andrew Young. 1898. (English.) 25 cents.

*The Art of Retouching.* By J. Ourdan. Illustrated. Cloth, $1.00.

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# NOTES

With this number THE PHOTO-MINIATURE completes its first volume. If any man has paid for a copy and regretted the investment we would like to hear from him. The making of the magazine has given us a year of very hard work—almost completely forgotten in the success which has attended it. Everybody has been most kind. Fellow-editors have said innumerable good things about the magazine: readers have shown an energetic and encouraging impatience for "the next number;" and advertisers—well, they have done nobly, all things considered. Our warmest appreciation goes out to all who have helped by their goodwill, or in other ways. A special word is here given to those who have so generously supplied prints for our illustrations, giving the grace of attractiveness to pages otherwise dryly useful. A glance over the "Contents" pages in this issue will show a roster of illustrators of which any photographic journal might well be proud. Let brotherly love continue. It is a co-operative enterprise, and all our profits have gone to the improvement of the magazine, number by number.

About VOLUME II? It begins with a little book on *Photographing Flowers and Trees:* the first complete work dealing with the subject, written by one who knows the flowers and how to photograph them. Some very charming pictures illustrate the text. The number is in type and should be ready soon after this appears. Another number deals with *Street Photography:* an interesting monograph about an interesting branch of photography. And we *are* going to publish on time, despite all obstacles, prophecies, etc.

N.B.—To avoid calamities (*i.e.*, missing a number of THE PHOTO-MINIATURE) see that your subscription is renewed promptly on receipt of this hint.

❧

There has just been published, by Gustav Schmidt, Berlin, a hand-book dealing with the photography of

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mountains, written and profusely illustrated by Emil Terschak. We have not seen the book, but it is said to be the best work on its subject.

◆

Supplementing what was said at page 573 of our last issue a later circular gives this information about the forthcoming *Philadelphia Salon:* October 21st to November 18, 1900.

"Pictures which have already been shown in Philadelphia at any exhibition open to the *general* public will be liable to exclusion.

"No awards are offered, and no charge will be made to exhibitors. Each exhibitor will be furnished with a catalogue, which will be the official notification of acceptance.

"No exhibitor may submit more than ten pictures, each of which *must be framed* separately.

"The title of each picture and the exhibitor's name and address must be clearly written on the labels provided, which must be attached by the exhibitor to the back of each picture. Nothing may appear on the front of the picture except the title and exhibitor's name.

"No accepted pictures may be removed before the close of the Exhibition.

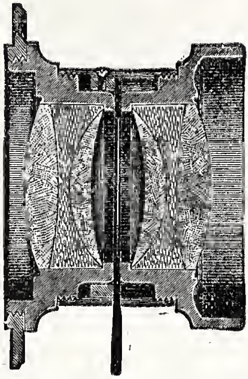
"Arrangement will be made for the sale of pictures if desired, subject to a commission of fifteen per cent.

"All communications and all pictures submitted for exhibition must be addressed to the Pennsylvania Academy of The Fine Arts, Broad Street, above Arch, Philadelphia, Penn., U. S. A. All pictures must be forwarded at owner's risk, *carriage prepaid*, and delivered at the Academy not later than 5 P.M., Monday, October 1, 1900. Return charges must be collected by carrier.

"The following reliable forwarders are suggested for the convenience of foreign contributors: Messrs. William Whiteley, Ltd., 151 Queen's Road, Bayswater, London, W., England; Messrs. Guinchard & Fourniret, 76 Rue Blanche, Paris; Messrs. Uhlmann & Co., Hamburg, Germany.

"The management will use all reasonable care to prevent any loss or damage to pictures in its charge, but will not be responsible for such occurrence.

"*Jury of Selection:* Mr. Alfred Stieglitz, New York; Mrs. Gertrude Käsebier, Brooklyn; Mr. Clarence H.



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Further information, if desired, may be had from Mr. Robert S. Redfield, Mr. J. G. Bullock, or Mr. Edmund Stirling, of the Photographic Society of Philadelphia, 10 South 18th Street, Philadelphia.

◆

A very handy *Chemical Prices Current* is issued monthly, for free distribution, by Charles Cooper & Co., 194 Worth Street, New York. The list shows the increase or decline in prices for the chemicals used in photography, and is a convenience which buyers will appreciate.

◆

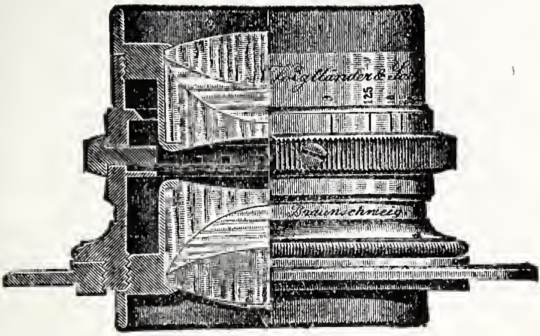
*How to Make Prints in Gum-Bichromate* is the title of a 14-page booklet published by the Haller-Kemper Co., Chicago, at ten cents post free. It is simply written and forms a useful introduction to the process described.

A few days ago we had occasion to ask the Haller-Kemper Co. whether their *Sensitol* (a sensitizing solution) could be used for making prints on enamelled surfaces. They informed us that it may be so used successfully, provided the enamelled surface first receives a coating of chrome gelatine. Cut 50 grains of gelatine into fine slivers with a scissors, and dissolve in ½ ounce glacial acetic acid by the aid of heat at about 100 to 110° Fahr., not higher. Make a separate solution of chrome alum, 10 grains, in ½ ounce of water. For use, take 1 dram of solution No. 1, two-fifths dram of solution No. 2, add 20 drams of alcohol and filter. Coat the enamelled surface twice with this mixture—allowing to dry between the coatings—and apply the *Sensitol* with a tuft of cotton attached to a medicine dropper. When dry, print quite deeply, not, however, letting the image bronze in the shadows, wash well, and tone with a sulpho-cyanide gold bath.

We also learn that a second (enlarged) edition of *Tolidol Talks* is ready, and would advise readers to get a copy by sending a 2-cent stamp to the Haller-Kemper Co., 37 Randolph Street, Chicago; or 150 Fifth Avenue, New York.

◆

The April exhibition at the New York Camera Club presented a collection of the photographic works of Miss



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Eva Lawrence Watson, of Philadelphia. We were only able to give the exhibition a hurried visit before its close, but the excursion yielded a delightful half-hour. Miss Watson's work has a marked delicacy of touch, and is sometimes a trifle sombre in tone, but her portraits left the impression that they were pleasing, as well as faithful, in likeness. And there was an absence of the fashionable extreme or straining after uncommon effects, which is refreshing now-a-days.

❧

One of the most skilful of American specialists in x-ray photography is Dr. L. A. Weigel, of Rochester, N. Y. Professor Goodspeed, of the University of Pennsylvania is another. Some days ago Dr. Weigel permitted us to look over a few of his recent prints and their remarkable quality deserves mention. In these photographs the usual silhouette of bone structure was wholly absent, and in its place we saw a finely detailed map of bone structure yielding the surface markings and changing character of the bones at different points of the subject. Variations of opacity in the flesh, such as layers of fat, etc., were also revealed with surprising distinctness, and altogether the work was much in advance of anything we have yet seen. Dr. Weigel modestly asserted that the secret of his success lay in the development of the negatives. He uses Cramer plates and develops with pyro. For the latter an ounce of pyro is dissolved in four ounces of alcohol (this "keeps" unimpaired for weeks). Of this stock solution from 5 to 15 drops per ounce of developer is mixed with varying proportions of almost saturated solutions of sulphite and carbonate of soda. The suggestion is worth noting.

❧

Those who are "unhappy" over the somewhat peculiar tendencies of the "new movement" in pictorial photography headed by Messrs. Stieglitz, Keiley, *et al.*, will relish the contributions by A. Smiler, entitled *The Keeley Cure* (or *how it came to be written*) and *The Transcendentalists*, published in the April and May numbers of the *Photo-American*, New York. There is much speculation as to the identity of the author of these cleverly written "comedies," and some ingenious

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"guesses" have been made, but we hope for at least one other "comedy" before the culprit is exposed—developed and fixed.

* * *

An interesting paper on *Telephotography* was read by Mr. Frank S. Dobbins at a recent meeting of the Photographic Society of Philadelphia. We presume that the paper, in its entirety, will be published in the *Journal* of the Society, but print the *Tables of Exposure Ratios* suggested by Mr. Dobbins for the benefit of workers who may not see the paper on publication.

## SUGGESTED TABLES OF RATIOS OF EXPOSURES.

By Frank S. Dobbins.

For use with Telephoto Combinations (positive and negative lenses). Multiply the normal exposure with ordinary photographic lens for an object in the shadow by the figures given (usually one determines the normal exposure with a Wynne's Exposure Meter by holding it in the shadow of the body).

I. For objects 1,000 feet distant or less, using no color-screen:

| *Magnification* | *8* | *7* | *6* | *5* |
|---|---|---|---|---|
| Dark objects in shadow | 64 | 49 | 36 | 25 |
| Dark objects in good light<br>Bright objects in shadow | 48 | 36 | 27 | 18 |
| Bright objects in good light | 32 | 24 | 18 | 12 |
| Bright objects in intense light | 16 | 12 | 10 | 8 |

II. For objects more than 1,000 feet distant, using a color-screen and isochromatic plates. If no screen is used, the exposure will be, of course, but one-fourth the length of time when the screen is used.

| *Magnification* | *8* | *7* | *6* | *5* |
|---|---|---|---|---|
| Dark objects in shadow | 64 | 49 | 36 | 25 |
| Dark objects in good light<br>Bright objects in shadow | 50 | 38 | 28 | 20 |
| Bright objects in good light | 36 | 28 | 21 | 15 |
| Bright objects in intense light | 22 | 18 | 14 | 10 |

NOTE.—These tables are only tentative.

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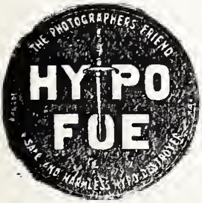

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Among the trade catalogues worth having at hand for the information they contain, the new *Thornton-Pickard Shutter List* deserves mention. This list is illustrated with examples of the work done by the various Thornton-Pickard shutters, and affords many useful hints concerning instantaneous photography. It may be obtained from Messrs. A. J. Lloyd & Co., 325 Washington Street, Boston. Some years of practical experience with these shutters enables us to recommend them with confidence, and we are glad that the American agency has at last been placed with a firm that will give them the publicity they deserve.

❧

An interesting announcement is made by Messrs. E. & H. T. Anthony & Company, 122 Fifth Avenue, New York. It informs amateur photographers that this old established firm of wholesalers has organized *The Amateur Institute of Photography*, to disseminate information and demonstrate the latest improvements in photography. The privileges of the *Institute* are (1) the use of a thoroughly equipped dark-room, with the assistance of an expert if desired; (2) admission to all practical demonstrations of photography, to be announced from week to week; (3) reference to a library of photographic journals and books; and (4) answers in person, to technical or practical questions concerning the practice of photography. Membership is without charge, and all amateurs are invited to apply for the card admitting them to these privileges. The enterprise is one which will meet a well-defined need among the amateurs of New York and its vicinity, and we congratulate Messrs. Anthony & Co. upon its inauguration.

❧

Our collection of historical prints has recently been enriched by the gift of several unusually interesting examples from Mr. Edward L. Wilson, the veteran editor of *Wilson's Photographic Magazine*. Among these is a carbon print by Johnson's "new and simplified process," 1869; an early example of the collographic process by Albert, of Munich, 1870; an Eburneum print on imitation ivory (oxide of zinc in gelatine) by Burgess, the inventor of the process; a *carte* figure study by Thomas Edge showing the use of natural foregrounds in the studio, made over a quarter of a century ago; an

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early example of multiple portraiture of about the same date; an ambrotype; a collodio-chloride, matt-surface print on mica, made by G. Wharton Simpson in 1864–65; and a plain silver print by Davies' shellac and gelatine method, made by sensitizing a bit of a poster-bill. Looking back over the history in which these prints mark the milestones of the years, one is forcibly reminded that many of the novelties of to-day in photography are, after all, but a sort of "resurrection pie" made over from "novelties" which grew old, and died before many of us saw the light of day!

❧

We have very satisfactory reports from Western readers concerning the new sensitized papers introduced by the Western Photo Paper Co., 1008 Cable Building, Chicago. One of these, *Cyko*, is an excellent developing paper, manipulated by gaslight, and therefore suitable for making prints at night. We have used *Cyko*, and like its qualities. It permits of reasonable latitude in exposure, yields good prints from a variety of negatives, and gives a crisp black image of pleasing depth with good gradation in the half-tones. The other papers we will report upon when the opportunity of testing them arrives.

❧

The Lovell Dry Plate Mfg. Co., New Rochelle, N. Y., announces a competition for $100 in prizes, open to amateur photographers in Greater New York, Westchester County, Jersey City, Newark, Paterson, and towns within a radius of twenty-five miles of New York, and closing June 30th. The competition is an open one, as far as subjects and size of picture are concerned, any subject and all sizes being equally acceptable. No entry fee is required, and competitors may send as many prints as they may desire. Negatives for all pictures entered, however, must be made on *Lovell* plates between May 1st and the closing date, and the negatives of the prize-winning pictures are to become the property of the Lovell Dry Plate Mfg. Co. The $100 offered will be divided as follows: $25 to the maker of the best picture submitted; $20 for the second; $15 for the third; $10 for the fourth; and $5 each for the six next best. The judges in the competition are Mr. Henry

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Wenzel, Jr.; John A. Tennant, and a well-known professional photographer yet to be chosen. All prints intended for this competition must be delivered prepaid, before July 5th, to John A. Tennant, 289 Fourth Avenue, New York. All competitors will be notified of the results of the competition, and checks for the amounts won will be delivered by the Lovell Dry Plate Co. from their New York office, 621 Broadway, New York.

◆

The current issue of the *Transactions* of the Edinburgh Photographic Society contains an instructive article on *Paper Manufacture* with reference to its photographic use; and *Still Life Photography*, a suggestive little paper, labelled *All Rights Reserved.*

◆

As this number will probably reach the reader a day or two before the coming total eclipse of the sun, May 28th, the following suggestions may be of some help to those who desire to obtain photographic records of some phase of the eclipse. They are taken from a recent paper by Professor George E. Hale, and the circular issued by the Astronomical Society.

### *Small Photographs of the Corona.*

Every possessor of a suitable camera is equipped with apparatus sufficient to give valuable results in photographing the corona. As Mr. Maunder has pointed out in his interesting discussion of the results obtained at the recent Indian eclipse, with lenses of focal length not greater than five feet and ratio of aperture to focal length not greater than one-fifteenth, it is not necessary to have an equatorial mounting for the camera when the exposure does not exceed one-half second. It must not be supposed, however, that it is only necessary to point any camera at the sun and make a snap exposure. Such a procedure might possibly produce a good picture of the corona, but the most valuable results will be obtained by those who observe a few simple precautions:

*a.* It is advantageous to use lenses of considerable focal length (from thirty to sixty inches), provided the angular aperture is not too small. Such lenses should show the corona on a scale large enough to bring out

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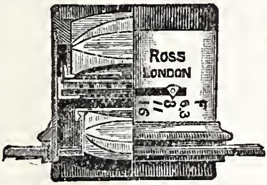

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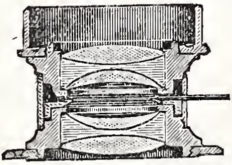

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many important details. Very short-focus lenses will be useful for long-exposure photographs of the coronal streamers, if mounted equatorially, and moved by clockwork.

*b.* Light and unsteady camera boxes should not be employed. A strong wooden box of the proper length is much more suitable than a camera having leather bellows.

*c.* It is of great importance that the camera box should be very solidly mounted, so that it will not be affected by the wind, and not easily set into vibration by any cause. Unless an equatorial mounting is to be used, it will be advantageous to screw the wooden camera box to the top of a post firmly planted in the ground. The optical axis of the lens should point toward the sun at the middle of totality. Unless the focal length of the lens exceeds five feet, or the diameter of the field is very small, it will be unnecessary to change the position of the camera during totality.

*d.* The lens can be most accurately focused by photographing star trails, a series of exposures being made for different positions of the lens. After the best focus has been ascertained the lens should be firmly clamped in place.

*e.* The results obtained at the Indian eclipse demonstrate the great advantage of using multiple-coated plates. It will be best to employ triple or quadruple coated plates, and as a further safeguard the plates may also be given a suitable backing in order to still further reduce the danger of solarization. With such plates it is possible with an equatorially mounted camera to obtain the faint outer extensions of the corona without serious interference from the bright inner corona. However, too much should not be left to the plates, for the care exercised in development is of the greatest importance.

*f.* With the most rapid plates it would appear from the results discussed by Mr. Maunder that an aperture of *f*/15, exposures of from $\frac{1}{60}$ second to $\frac{1}{45}$ second will suffice for the prominences and $\frac{1}{10}$ second to $\frac{1}{6}$ second for the inner corona. Such short exposures can, of course, be given only with the aid of a suitable shutter. A greater extent of the corona may be obtained with exposures from ½ to ¾ second. Mr. Maunder believes that, in order to obtain a photograph of the corona as a whole,

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the exposures should not exceed one second. It is evident that most of the exposures so far referred to are easily within the reach of those who employ fixed cameras. If it is desired to secure the great extensions of the corona, which at the Indian eclipse were traced to a distance of nearly fourteen lunar radii from the sun, the camera must be mounted on an equatorial telescope provided with a driving-clock.

*g*. Care must be taken to provide for the accurate orientation of all photographs, as it is highly important that the north and south points of the image shall be known. If the plate stands in a vertical position, as it may when a heliostat is used, a fine plumb line hanging immediately in front of it will give satisfactory results. In the more common case, where a camera pointing at the sun is employed, a series of rapid exposures made with reduced aperture during the partial phase, while the sun moves across the stationary plate, will serve the purpose.

### *Photographs of the Corona During the Partial Phase.*

During the recent Indian eclipse Mrs. Walter Maunder, using a triple-coated plate and a Dallmeyer stigmatic lens of 1½ inches aperture and 9 inches focal length, succeeded in securing a photograph of the inner corona 39 seconds after the end of totality. As Mr. and Mrs. Maunder point out, it will be advisable to repeat and extend these experiments at the coming eclipse. The problem of photographing the corona in full sunlight is one which has received a great deal of attention, but hitherto without tangible result. It may be doubted whether the use of multiple-coated plates will be sufficient of itself to overcome the great obstacle of atmospheric glare, but it is not impossible that the corona can be photographed in this way during partial eclipses. A series of exposures made before and after totality on multiple-coated and heavily backed plates should be of value, especially if the image of the photosphere is prevented from falling on the sensitive film. An occulting disc before the plate should, therefore, be employed if possible. Mr. Maunder believes that with an aperture of *f*/15 the exposures out of totality should range from $\frac{1}{5}$ second down to $\frac{1}{50}$ second.

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tioned against a dense development of the plate. This has been the great fault with most of the negatives at previous eclipses. The image should be slowly developed and kept as thin and transparent as possible.

All photographic plates used in the eclipse problems should be "backed" to prevent halation. Water-color lampblack, reduced to the consistence of paste and applied to the back of the plate, will answer well for this purpose. Or the back of the plate may be flowed with a mixture of normal collodion 100 parts, chrysoidine 3 parts.

For valuable information regarding probable weather conditions, local time and duration of totality, etc., reference is made to *Weather Bureau Bulletin* No. 209 and the supplement to the *American Ephemeris* for 1900.

◆

In *The Model Engineer and Amateur Electrician* Spon & Chamberlain, 12 Cortlandt street, New York, issue an ideal magazine for those who are interested in the construction and working of models. As its name implies, electricity and engineering are leading topics, but other subjects, such as the designing and building of model yachts, receive adequate attention. Published monthly for 75 cents a year, the magazine should steadily increase in circulation and popularity.

◆

All who use photographs for any purpose, whether business or hobby, will be pleased to learn that *An Index of Standard Photograms*, on which the editors and staff of *The Photogram* have been engaged for many months, nears completion. To attempt to classify the million and one available photographs in a list to be of use to publishers and others is a big task, and we are not surprised to learn that the contemplated volume of 144 pages has already grown to one of 600 pages. The publishers announce that the subscription price may at any moment be advanced from $5, and that it will certainly be advanced on publication.

◆

*An important correction.*—If the reader will turn to page 305, in No. 6, THE PHOTO-MINIATURE, and change the figure 8 on the first line of the text to 3, he will correct an error in proof-reading, and the formula, so amended, yields a thoroughly reliable developer for

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❧

Mr. William B. Dyer gives a capital account of the *Chicago Photographic Salon* in the May number of *Brush and Pencil* (Chicago). Having heard considerable praise of the purely Western work shown at the exhibition, the illustrations accompanying Mr. Dyer's text are disappointing, comprising, as they do, reproductions of pictures by Eastern men, which have been already engraved many times in one place or another. One can get too much of a good thing, and it might be well to create a sinking-fund by which certain photographic masterpieces might be bought for storage, and thus retired from the public eye—reproduction forbidden for fifty years. The two examples of Western photography given with the review are refreshing both in their newness and treatment, and we would like to have seen more such. The pictorial side of the *Salon,* however, is to be fully reproduced in *The Photo Beacon* for June (not yet received), and in Mr. Todd's hands one may be tolerably sure that the great West will get its share of glory. We suggest that ten cents invested in the June *Photo Beacon* will be money well spent.

❧

The Royal Photographic Society announces its forty-fifth annual exhibition to be held at the New Gallery, 121 Regent Street, London, W., October 1st to November 3d. The exhibition is divided into five sections: I. Selected Pictorial Work; II. General Professional Work; III. Photographic Apparatus; IV. Photo-mechanical Processes; and V. Scientific Photography. Intending exhibitors should apply for entry forms and particulars without delay, addressing the Hon. Secretary John A. Hodges, R. P. S., 66 Russell Square, London, W. C., England.

❧

An anonymous ass, writing in the Glasgow *Evening Times,* says: "It is notorious that American photographic magazines are run by extracting—'lifting' is the technical term—articles solid from their English contemporaries; and when this time-honored and economical plan is departed from, and a member of the editorial

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staff takes off his coat, so to speak, to do something original, the result does not usually contribute to the honor either of American photography or literature." Which, without further comment, proves that the A. A. knows little or nothing of American photography and its literature.

❧

*Platinograph* is a new development printing paper announced by the Platinograph Photo Manufacturing Company, Los Angeles, Cal. It is a quick daylight paper, giving a print in one minute in sunlight, and easy to manipulate, requiring only two solutions, for development and clearing. The prints we have seen closely approximate genuine platinotypes in appearance, and show a good range of gradation in tone with more detail in the shadows than is usual with papers of this class. A specimen package of the paper, with developer for actual trial, may be had at a trifling cost from the manufacturers.

❧

The limited edition of the "*Camera Notes*" *Improved Glycerine Process* for the development of platinum prints, by Messrs. Stieglitz and Keiley, is fast disappearing. Those who desire the information and practical demonstration it offers should therefore avoid possible disappointment by securing a copy without delay. It will not be reprinted.

❧

*Silkdown*, the new, ready-sensitized "blue print" fabric introduced by the Nashua Pillow Company, Nashua, N. H., is very much in evidence at the stores of the dealers at present. The examples shown are extremely effective and lend themselves to decoration in a happy way. If enterprisingly "pushed" this specialty should find wide popularity among amateurs, as well as for commercial work where paper prints are sometimes inconvenient to handle.

❧

We are reprinting No. 7, THE PHOTO-MINIATURE, dealing with *Platinotype Processes*, in order to meet the growing demand for information concerning these printing methods. The reprint will be ready in a few weeks, and makes the sixth number reprinted of the twelve published.

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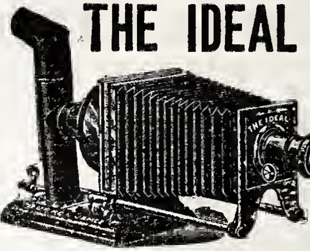

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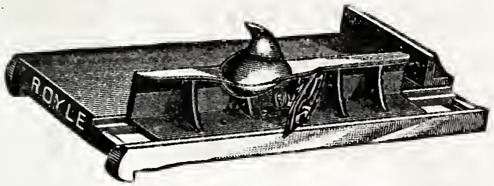

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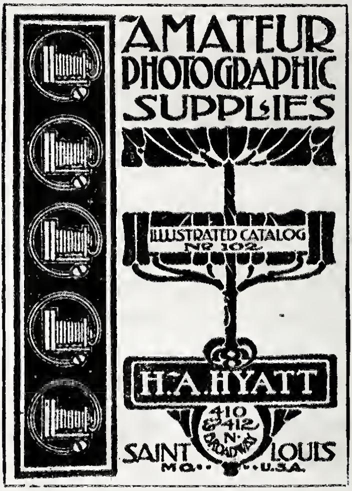

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